## Eponymous terms in orthopedic surgery

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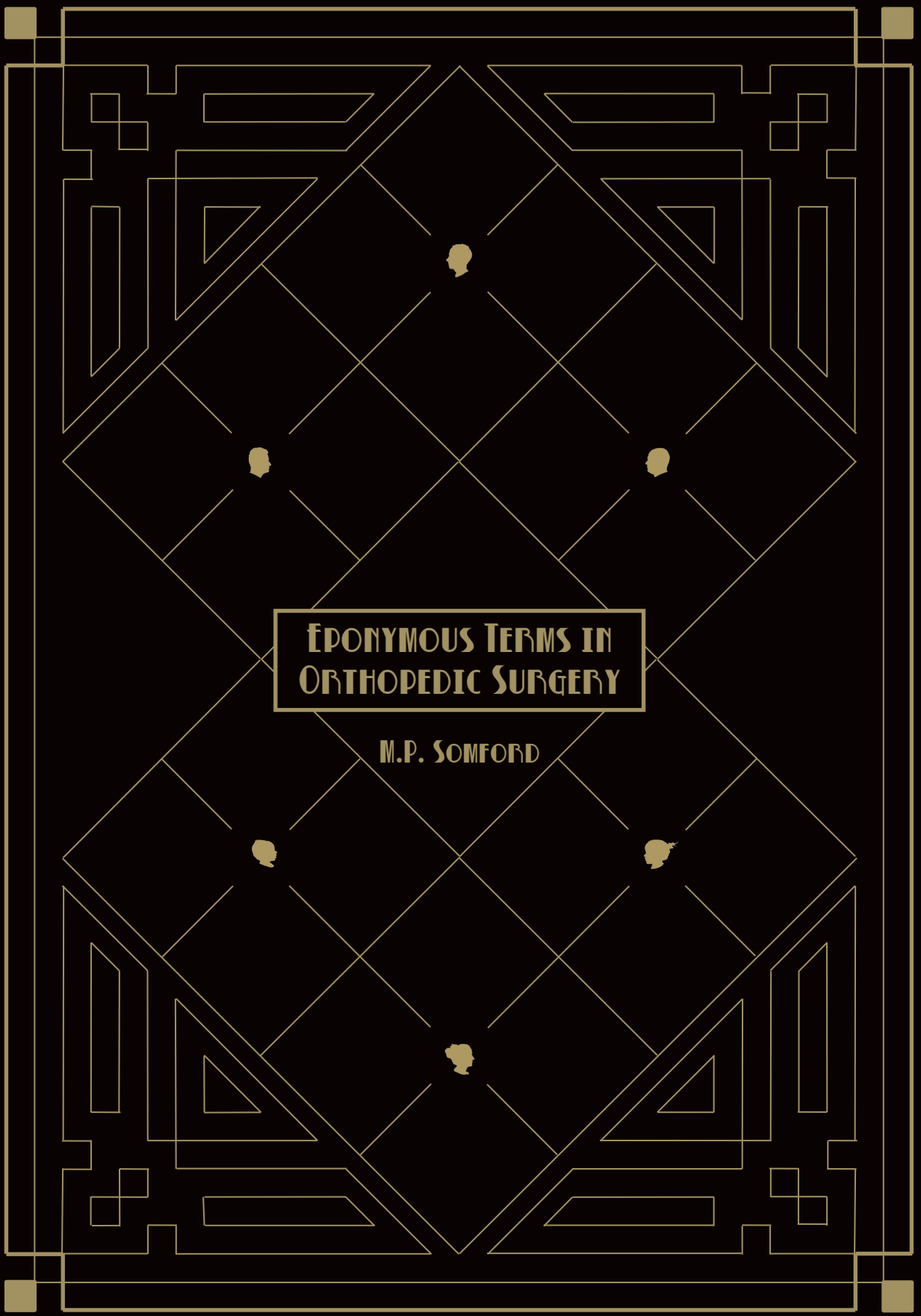
Eponymous Terms in Orthopedic Surgery
M.P. Somford

# Eponymous terms in orthopedic surgery

Matthijs P. Somford

“Eponymous terms in orthopedic surgery”
Matthijs Paul Somford

PhD thesis, Academic Medical Center, Amsterdam, the Netherlands



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# Eponymous terms in orthopedic surgery

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**Table of Contents**

# CHAPTER 1

## General introduction

## General introduction

*Eponymous terms*

The word “eponym” originates from the Greek language. It is derived from the word “eponumos” [ἐπώνυμος] and means “named (-onumos) after (epi-)”. It is the exact opposite of “anonumos” [ἀνώνυμος], meaning “named after no one or nothing (anonymous)” (Table 1). The word eponym can refer to the namegiver itself or the derived term formed from the name of the namegiver. For instance, the person Achilles is the name of a Greek legend. His name is attached to the calcanear tendon, therefore Achilles himself is an eponym. However, the derivative term Achilles tendon can be considered an eponym or an eponymous term. In this thesis we tried to refer to the derived word as an “eponymous term” and to the namegiver as an “eponym”.

*Table 1: Definition of the word “eponym”*[29]

| Eponym (noun) | |
|---|---|
| ep·o·nym (ep’ə·ˌnim) | |
| 1: | a personage assumed as the founder and namegiver of a race, state or city; also, the name of that personage. |
| 2: | A name or phrase formed from the name of a person to designate a people, period, scientific theory, disease, etc. |

Eponyms are almost as old as language. The first known eponymous terms are from 2000 BC, when the Assyrians named their calendar years after their high officials.[1] Although the Assyrian naming of years is no longer in use, our modern calendar also has eponymous terms. The months March (Mars, god of war) and August (emperor August 63 B.C.-14 A.D.) are eponymous terms from ancient Roman times.

In medical science most eponymous terms can be attributed to doctors, although in the past names of cities or patients have also been used as eponymous terms. Examples in medicine are Lyme disease (Lyme, Connecticut) and Lou Gehrig’s disease (disease suffered by Henry Louis Gehrig, 1903-1941). What became known as Lyme disease was seen in 1975 in a large cluster of cases in three towns of southeastern Connecticut. This included the towns of Lyme and Old Lyme, giving the disease its popular name. Lou Gehrig was a well-known baseball player of the New York Yankees. He died of amyotrophic lateral sclerosis (ALS) in 1941, and ALS in the United States now has his name attached to it.

Eponyms in general, but particularly in medicine, can arise in several ways:

1) By referencing an original description
2) As a tribute to (for instance) a teacher or colleague
3) By naming something after yourself

The first way is probably the most common. The second is a very great honor and the greatness of being truly "named after" is not bestowed on many people. In general, more disputes have arisen from colleagues "stealing" an eponym than there are eponymous terms developed in honor of a co-worker. The third way is in our opinion the least fancy and quite arrogant. Proposing an eponymous term yourself can be associated with a syndrome in which a physician searches for a new discovery to which his name can be attached – it is known as Tashima syndrome.[2] This syndrome was, not surprisingly and at least partly ironically, proposed by C.K. Tashima himself.[2]

Eponymous terms are generally well-embedded in our language and are not always easy to identify. When an eponymous term is absorbed into our daily language the capital letter often disappears, adding to the difficulty in recognizing its origin;[1] the link to the namegiver is also at risk of being lost. The eponymous terms "boycott" (Charles Boycott, 1832-1897), "saxophone" (Adolphe Sax, 1814-1894) and "diesel" (Rudolf Diesel, 1858-1913), for instance, can be easily traced back to their namegivers, but most people using these terms will have no knowledge about their biographies. They are also oblivious of the origin and history of the eponymous term. It is ironic that, although he or she is immortalized in a term, the true eponym becomes forgotten.

Next to losing their capital, most eponymous terms in medicine are non-possessive. This was advocated amongst others by the Canadian National Institutes of Health, which published its conclusions on the naming of diseases and conditions in The Lancet. They concluded that "[…] the possessive use of an eponym should be discontinued, since the author neither had nor owned the disorder[…]".[3] In the case of Huntington's disease, for instance, this is not fully applicable, since George Huntington (1850-1916) himself was diagnosed, as were his father and grandfather, with the disease that came to bear his name.

*Common criticism on the use of (medical) eponymous terms*

The aforementioned issues make eponymous terms a grammatically interesting yet challenging entity. But they are complex not only from a linguistic point of view: eponymous terms are also criticized in their practical daily use. This was brought to the foreground by several people, one of them Charles Darwin. He wrote his objections in a personal communication with the naturalist and geologist Hugh Strickland in 1849,[4] stating that first of all eponymous terms are a sign of hasty work and that they are also denominative instead of descriptive. It is especially the labeling and not the descriptions which is one of the problems that lead to discussions about the use of eponymous terms.[5] This may produce mismatches between the original find-

ings and subsequent observations of the same condition.[6] Most medical eponymous terms originate when a disease is discovered. Often the insights on the origin or development of the disease change over time with improving knowledge and better diagnostic tools.[7–9] As a result, contemporary use and interpretation of certain eponymous terms are not fully comparable to the observations made at the time of the original description. This can lead to confusion in dialogues and scientific discussions.

One of the limitations in the use of eponymous terms is that the presumed meaning may differ greatly between those who use them.[10] If we extrapolate this problem to another scientific field we can see the potential consequences of comparable grounds for misunderstanding terminologies. In 1999 the Mars Climate Observer (costing $125 million) crashed because the spaceship was programmed in British units whereas another team entered data in the metric system.[11] A failure to communicate uniformly can have far-reaching consequences.

There is also the possibility that an eponym is not the first to describe the eponymous term, therefore eyebrows may be raised at the person the honor of the eponymous term is attributed to, questioning the legitimacy of how this honor was received.[12] In terms of criticism on eponymous terms, four general statements were made by Ravitch in 1968[13] (Table 2). He nuanced and simplified his allegations in 1979:[14]

1) The man so honored was not the first to describe the disease, operation or instrument
2) He misunderstood the situation
3) He is generally misquoted
4) 1, 2 and 3 are simultaneously true

*Table 2: The original four statements on eponyms by Ravitch.[13]*

| | |
|---|---|
| 1. | The disease, operation, lesion or structure was not first described, performed, observed or noted by the person memorialized. |
| 2. | If it was, its significance was not correctly understood by him/her. |
| 3. | The current meaning is at variance, often grossly, with the actual statement, observation or operation that formed the basis for the eponymic designation, i.e. the attribution is misinformed or erroneous as to what was originally said or done. |
| 4. | The attribution is a historically perpetuated error and has no basis in history. |

Strikingly, eponyms seem to be misquoted on a regular basis. When eponymous terms are frequently used but their meaning is not clear to all participants of a discussion or conversation, confusion or errors can arise. Waseem et al. demonstrated for one eponymous test (Finkelstein test) that only 10.7% of interviewed surgeons were familiar with the correct method of perform-

ing this test as described by Finkelstein.[10] When comparing this observation with the fact that 90.4% of the interviewed surgeons used the test for diagnostic purposes, there is a worrying conclusion that a majority of surgeons use a test without knowing the original performance method. Waseem et al. also traced the possible origin of the erroneous use of the eponymous term, which was a misquotation 28 years after the initial test was first described.[10]

Finally, a few eponyms have a questionable history and are therefore under dispute as to whether the eponymous term should be used at all.[8,15–22] The most well-known examples are Reiter syndrome,[21] Wegener granulomatosis[16] and Asperger syndrome.[22] Resistance against eponyms may have increased after World War II for this reason.[23]

*In defense of (medical) eponymous terms*

There is probably more than only drawbacks to eponymous terms. First of all, eponyms are a reminder of the humanity of medicine. All our predecessors who devoted their time and energy to the profession are in a way remembered by these eponymous terms that bear their names. Even though not everyone gets to be commemorated – with or without an eponymous term – they all contributed to the level of health care we practice today. Eponymous terms are a tribute to medical science. Perhaps an eponymous term is not always attributed to the first discoverer, but at least it is someone who made sure that the discovery gained notoriety among his peers. Such eponymous terms can be considered monuments to those who contributed to the science of human anatomy and medicine. Some would even consider eponymous terms a way to promote better health care.[24] By studying a disease and receiving an eponymous term a positive feedback cycle might come into action. The good work honored by an eponymous term promotes equivalent efforts.

Eponymous terms are easy shorthand in (medical) communication.[25] They are often easier to use in professional conversations instead of the original descriptive terms of a condition. Examples are “Monteggia fracture” versus “a fracture of the proximal third of the ulna combined with an anterior dislocation of the radial head at the proximal radioulnar joint”[26] or “Gerdy tubercle” versus “prominence on the lateral side of the proximal tibia where the iliotibial ligament and tibialis anterior muscle fibers attach”.[27] When classifications are developed for fracture types, for instance, they are a better alternative to eponymous terms. But classifications are not always available and are sometimes eponymous themselves. Examples are Bado (José Luis Bado, 1903-1977) for radial head fracture and Weber (Bernhard Georg Weber, 1929-2002) for fibular fracture.

Eponymous terms make communication easier and could be considered neutral terms that allow a concept to evolve free of any preconceived notions,[1,25] therefore they do not bias research in any particular direction.[1] The question is whether the problem of interpreting eponymous terms should be attributed to the eponymous term itself or to the users of these terms. In other fields, like geography (Tasman sea, mount Cook) and botany (Fuchsia, Gardenia), or at the pub (Guinness, Gordon's gin), eponymous terms seem to serve their purpose perfectly.[28] Table 3 provides a proposed top-10 of eponymous terms in daily life.

*Table 3: Top-ten of eponyms, published by Independent Digital News and Media Limited, September 14, 2014*

| Eponymous term | Eponym |
|---|---|
| Silhouette | Étienne de Silhouette (1709-1767) |
| Sideburns | Ambrose Burnside (1821-1881) |
| Pander | Pandare (a fictive character from Chaucer's Troilus and Criseyde) |
| Quixotic | Don Quixote (a fictive character from Cervantes' Don Quixote) |
| Shrapnel | Henry Shrapnel (1762-1842) |
| Trilby | Trilby (a fictive character from George du Maurier's Trilby) |
| Mesmerize | Franz Mesmer (1734-1815) |
| Maverick | Sam Maverick (1803-1870) |
| Diesel | Rudolf Diesel (1858-1913) |
| Bloomers | Emilia Bloomer (1818-1894) |

*Aim of this thesis*

This thesis is divided into three sections. Part 1, entitled "On the origin of eponymous terms", consists of research to gain understanding into how eponymous terms arise and what the effect of time could be on the supposed meaning and general use of eponymous terms. To this end we study the origin of the Pellegrini-Stieda lesion and the Kager triangle, and we review the use of the eponymous term Pellegrini-Stieda lesion from a surgical and historical perspective.

Part 2, 'The (presumed) fall of eponymous terms", analyzes the grounds on which eponymous terms are criticized. We try to assess whether eponymous terms are in use in daily practice and how they are used in modern medical literature. We further establish their use and reliability in our daily practice. Not all criticism is grounded when eponymous terms are used correctly in daily practice and medical literature. It is therefore important to establish how eponymous terms are used and if their proposed meaning is consistent. When eponymous terms are used incorrectly, we need to establish what the origin is of this incorrect use.

Part 3, entitled “In case eponymous terms are here to stay”, provides several reports on eponymous terms with a biographical background on the eponym. This is to ensure proper usage when an eponymous term remains in use in the future.

The following research questions were formulated for this thesis:
1. Does the meaning of an eponymous term change over time?
2. Are eponymous terms used in daily practice?
3. Are eponymous terms used correctly in the literature?
4. Are eponymous terms used correctly in daily practice?
5. Are eponymous terms reliable?

**Outline of the thesis**

*Part I: On the origin of eponymous terms*
**Chapter 2** presents the results of our literature review into the Pellegrini-Stieda lesion (ossification on the medial side of the distal femur). We analyzed 37 articles on the Pellegrini-Stieda lesion that were identified since the key publications. We compared these with the original description of the condition. We also retrieved from each paper the anatomical structure the authors propose from where the Pellegrini-Stieda lesion might arise.

**Chapter 3** reports on the results of a cadaveric study conducted to establish whether the origin of the lesion described by Pellegrini and Stieda may present as a comparable image on conventional radiographs. Six cadaveric knees were used to infiltrate either the origin of the medial collateral ligament (Pellegrini’s proposed origin) or the origin of the medial head of the gastrocnemius (Stieda’s proposed origin). By means of conventional radiography as was used in the days the original findings were described, we compared the two groups and analyzed them on comparability to each other.

**Chapter 4** describes the biography of Hans Alois Kager, the eponym for the Kager triangle of the ankle. We tried to establish how Kager’s description found its way into contemporary knowledge and whether his biography was influential to this process.

*Part II: The (presumed) fall of eponymous terms*

**Chapter 5** analyzes the origin and meaning of the Simmonds-Thompson test, accompanied by a biography of the two eponyms, as this eponymous test can give rise to confusion when the findings in case of a negative or positive test result are not clear. This is especially the case since one of the outcomes is an absent (negative) finding, which results in a positive test.

**Chapter 6** reports on the result of a Dutch national survey on the knowledge and use of eponymous terms. We approached 67 orthopedic surgeons to complete our survey with a list of 57 eponymous terms. They filled out whether they knew the eponymous term or not, and when known whether they used it in daily practice. The aim of this study was to establish whether eponymous terms are still in use in the Netherlands, and whether younger generations tend to use eponymous terms less frequently than older generations.

**Chapter 7** presents the results of a literature review on the contemporary use of eponyms in the field of shoulder and elbow surgery. All articles from 2014 reporting on 12 common shoulder and elbow surgery-related eponymous terms were analyzed. The meaning of the eponymous terms used was compared to the original meaning. In this way we tried to establish whether eponymous terms are used consistently and whether this was done according to the original description.

**Chapter 8** focuses on the result of an international survey on knowledge of eponymous terms and their use compared to the use of, for instance, classifications. In the first part of the survey we tried to establish whether the original meaning of the eponymous terms is known among the respondents. In the second part we tried to assess whether eponymous terms are favored over classifications or anatomical descriptions. We also calculated the reliability of eponymous terms.

*Part III In case eponymous terms are here to stay*

**Chapter 9** describes eponymous terms that are used in anterior shoulder-stabilizing surgery.

**Chapter 10** describes eponymous terms that are common in elbow fracture surgery.

**Chapter 11** describes eponymous terms in acetabular fracture surgery.

**Chapter 12** describes eponymous hip joint approaches.

**Chapter 13** describes eponymous terms that are connected to anatomy and fractures in knee surgery.

**Chapter 14** describes eponymous terms in ankle fractures.

**Chapter 15** describes eponymous terms around the Kager triangle.

**Chapter 16** contains the summary of this thesis and gives suggestions for future research.

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# PART I

## On the origin of eponymous terms

# CHAPTER 2

## The Pellegrini-Stieda lesion dissected historically

MP Somford, L Lorusso, A Porro, CJM van Loon, D Eygendaal

*J Knee Surg. 2017 Jul 30 [epub ahead of print]*

**Abstract**

The Pellegrini–Stieda lesion is a common finding on conventional X-rays. Whether it originates in the medial collateral ligament (MCL) of the knee or the medial head of the gastrocnemius muscle or another structure remains under debate. We discuss the difference in the articles by Pellegrini and Stieda and follow the vision on the origin of the lesion through time. A systematic research in PubMed/Medline was conducted, identifying all articles on the Pellegrini–Stieda lesion and analyzing them for proposed origin of the lesion. The articles with their conclusion based on either finding during surgery or magnetic resonance imaging (MRI)/computed tomography were analyzed in more detail. Our PubMed/Medline search identified 4,997 articles. After exclusion of articles that were not on the Pellegrini–Stieda lesion and of doubles, 27 articles remained. By checking the references manually, 10 more articles were identified. Proposed origins were MCL, medial gastrocnemius, adductor magnus, vastus medialis, deep MCL, and superficial MCL. Although the MCL was most often coined as origin of the lesion (54% overall, 25% on MRI, and 57% during surgery), many cases remained undecided (50% on MRI) or no specific structure was found to be the origin (29% during surgery). There are diverse proposed origins of a calcification on the medial side of the knee. The eponymous term Pellegrini–Stieda lesion seems fitting, as it comprises two different thoughts on the origin of the lesion. MRI seems to be a noninvasive and quite accurate method for future research.

An observation that is regularly made on conventional radiographs of the knee is a bony shadow on the medial side of the femur. Most often, there is no correlation with the patient's complaints and it is therefore considered an incidentaloma.

Over time the lesion has been termed Pellegrini–Stieda phenomenon,[1] Pellegrini–Stieda sign,[2] Pellegrini–Stieda lesion,[3,4] and Pellegrini–Stieda disease.[5–7] Nowadays, the radiographic finding of the lesion is termed Pellegrini–Stieda phenomenon/lesion/sign, whereas the combination of the radiographic anomaly at the designated location with pain at that site is known as Pellegrini–Stieda syndrome.[8–10] Whether the origin is the medial collateral ligament (MCL) of the knee or the medial head of the gastrocnemius muscle (GM) or another structure remains under debate. We discuss the difference in the articles by Pellegrini and Stieda and follow the vision on the origin of the lesion through time.

## Materials and Methods

The purpose of this article is to discuss the findings as described by Pellegrini and Stieda and to compare them with contemporary literature to find whether the statements from the early 1900s are still valid today (Table 1). We translated the passages from the Pellegrini and Stieda's articles that elaborate on the origin of the lesion.

Afterward, we conducted an unlimited PubMed search on "Pellegrini–Stieda," "Pellegrini," and "Stieda." The articles were analyzed for the proposed origin of the ossification on the medial side of the femur. Next, a differentiation was made between assumed origin and found origin on surgery (gold standard) or magnetic resonance imaging (MRI). The proposed origins were compared and grouped to find out whether consensus could be reached about the structure from where the ossification develops.

*Table 1: Comparison of the original descriptions of the bony lesion given by Pellegrini and Stieda in their original papers*

| | Pellegrini | Stieda |
|---|---|---|
| Location | Internal side of the left knee | Internal epicondyle |
| Size | Little pigeon's egg | Not stated |
| Shape | Elongated | Not stated |
| Anatomical position | Covering the two tubercles of the medial femoral condyle, leaving the adductor tubercle uncovered. | Upper part of the internal epicondyle |
| X-ray | Perfectly normal distal end of the femur and proximal end of the tibia; laterally to the medial collateral ligament of the femur, following its boundaries and becoming separated for a short distance. | A 1-cm high and 2-cm long fragment in the proximal part of the epicondyle, consisting of spongious structure. About 0.5 cm from the surface of the bump an inwardly oriented fracture line is visible. |
| Surgery | We opened the ossification and the tumor is visible where it began from the epicondyle, adhering and going down along the tibial collateral ligament of the knee. Blows are given with the chisel on the top of the tumor adherent to the epicondyle, removing barely a thin layer of bone of the femur, then with the scissor we cut the distal end of the tibial collateral ligament, keeping a certain distance from the end of ossification. | The proximal part of the epicondyle is strongly developed, with a total height of 1.5 cm, and because of a fracture parallel to its insertion it is split into two closely related, evenly large halves. The fractured part is connected through its anterior border to the femur by soft -tissue attachment. The under-surface of the fractured part is slightly concave and has a rough bony surface. The musculature that is connected to the fragment is dissected away. |

## Results

Pellegrini described the first reported case of calcification, involving the collateral ligament of the knee in a 36-year-old man examined at the Department of Surgery in Florence on March 13, 1905.[11] The injury dates back to October 6, 1904, when the patient fell at work from a height of 2 m, forcibly striking the internal knee surface on an iron vessel. He described the following ossification localization and the radiographic, macroscopic, and microscopic features:

1. On the internal side of the left knee, a swelling is present with the dimension of a little pigeon's egg. The swelling has an elongated shape in the longitudinal axis of the limb, extending distally, and it appears to go beyond the joint line.

2. The tumescence has a hard, bony consistency and is fixed, but to determine this picture, we are forced to apply strong pressure, providing further evidence that the tumor is completely anesthetic (…), it partially covers the two tubercles of the medial femoral condyle, leaving the third adductor tubercle uncovered.

3. X-ray examination of the affected area reveals a shadow of the perfectly normal distal end of the femur and proximal end of the tibia; the tumor produces a light shadow which is just perceptible at the base of the soft parts: it is located laterally to the MCL of the femur, following

its boundaries and becoming separated for a short distance; some discontinuity is perceivable in the shadow close to the distal end of the tumor; the separate portion of the tumor manifests a less intense shadow than the remainder.
4. In the surgery on April 30, 1905,we opened the ossification and the tumor is visible where it began from the epicondyle, which adheres and goes down along the tibial collateral ligament of the knee. With the chisel, blows are given on the top of the tumor adherent to the epicondyle, removing even a thin layer of bone from the femur, and then with the scissor, we cut the distal end of the tibial collateral ligament, keeping a certain distance from the end of ossification.

Pellegrini concluded that the cause of ossification in the present case must be found in a single trauma, suffered by the patient 5 months before the surgery. This type of development is not the most frequent: ossification of the tendons and muscles is observed more often after repeated trauma.

Stieda made the observation of a calcification at the medial side of the distal femur, which he described in 1908.[12] On the anatomy of the location of the ossification, he states: On the latter (medial epicondyle) are the insertions of the following:
1. The part of the knee capsule that is known as internal ligament or tibial collateral.
2. The medial head of the GM and indeed the medial portion of this head, while the lateral portion of the medial head is attached at the popliteus plane.
3. The medial head of the gastrocnemius, covering the lower portion of the adductor magnus (AM).

The band (collateral tibial ligament) is placed at the lower (distal) portion of the so-called epicondyle, which is more flattened, while the GM and the AM are attached to the upper (proximal) portion of the epicondyle.

He further describes a specimen at the anatomical institute with an ossification that he dissected. His findings were stated as follows:
In the described preparation, it undoubtedly concerns a rupture of the upper part of the internal epicondyle, and in our clinically observed cases, we may also well suppose an analog injury, especially since the position of the shadow in the X-ray fits more with a tear of the muscle insertion (upper portion of the internal epicondyle) than with a tear of the insertion of the inner sideband (lower portion of the internal epicondyle). Further, whether the projection comes off by direct force or because of muscle pull is an interesting question.

Our PubMed/Medline search identified 4,997 articles (Fig. 1). After exclusion of articles that were not about the Pellegrini–Stieda lesion and of doubles, 27 articles remained. By checking the references manually, 10 more articles were identified. Two articles from the references could not be traced due to unavailability of the journals in our resources ("Pytel Sovetskaja Chirurgia" and "Mateos M. Semana Méd"). We analyzed the articles chronologically. We will discuss in more depth only those that describe surgery or which took an MRI or computed tomography to identify the origin of the lesion, as these will most reliably suggest the origin.

We have mentioned the descriptions by Pellegrini and Stieda. Peracchia operated on the lesion but did not mention the involved structure during surgery; histologically, it was similar to Pellegrini's findings and thus thought to be situated in the MCL.[13] Kulowski upon surgery found the lesion to be closely related but clearly unattached to the gastrocnemius tendon, AM tendon, and MCL.[14] Coltart operated on a lesion and found it to be attached to the MCL and free from the AM tendon.[4] Bocchi also located it in the MCL.[15] Wiebeck removed the lesion during meniscal surgery but did not state the anatomical location.[16] Nachlas concurred with Kulowski and could not find a structure containing the lesion.[17] Mennella and Naifovino operated on two cases but do not describe the surgical findings.[18] The same goes for the report by Tatò.[19] Wang and Shapiro found the origin to be invested in the deep MCL.[20] Niitsu et al removed the lesion from the superficial MCL (sMCL).[21] Theivendran et al found a "flimsy" MCL upon removal of the lesion.[9] This might be due to an MCL lesion but also because of the removal of the lesion. The conclusion of the article is that the MCL is the origin and removal of the lesion might compromise MCL function.

MRIs were taken in four cases studied by Niitsu et al.[21] They found the lesion to be situated in the superficial layer of the MCL.[21] Mendes et al reviewed the MRI scans of nine patients with a medial ossification and found that the lesion appears in the MCL (six cases), AM (two cases), or both (one case).[22] De Vis and Kersemans described the ossification on the medial side of the femur in an MRI without mentioning whether there was involvement of any structure.[5] In a very recent study that reviewed 27 patients with Pellegrini Stieda who underwent MRI, the sMCL was found to be the location in 8 patients, 7 patients had a solitary lesion of the posterior medial patellofemoral ligament (MPFL), and 12 patients had a combined lesion of these two structures.[23]

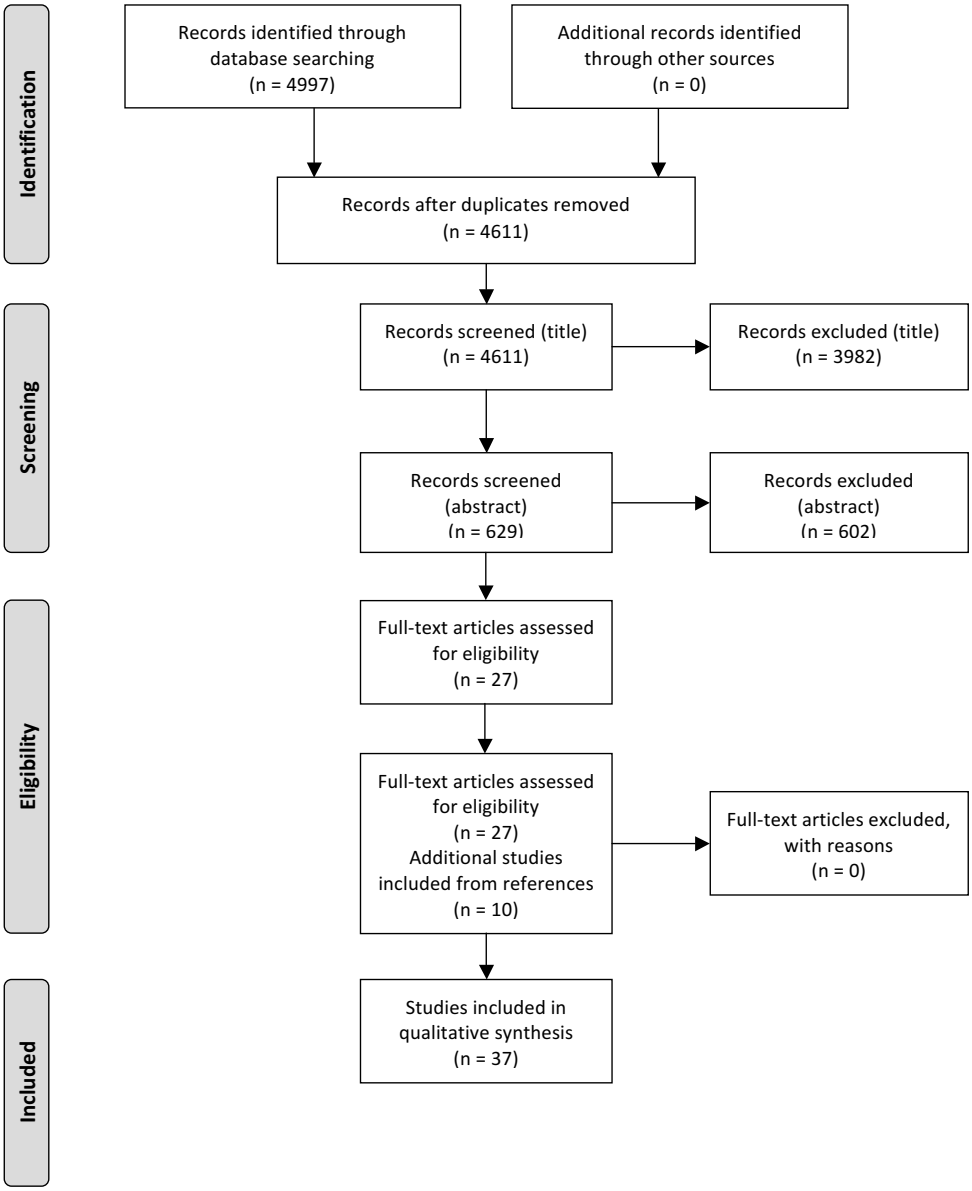


*Figure 1. Flow diagram*

## Discussion

In 1904, Cahier reported 54 cases of ossification of muscles on the medial side of the knee, but ossifications of ligaments were not reported and no radiographs were included in his article.[24] The first known publication of an X-ray with an ossification on the medial side of the femur was in 1905 by Köhler (1847–1947), a German radiologist.[25] The lesion is presented in his anatomical atlas without comment on its anatomical origin. The cause was a trauma and there was also a bony shadow on the lateral tibial side, appearing to be a Segond fracture.[25] Again in 1905, Italian surgeon Pellegrini (1877–1958) published his findings on ossification on the medial side of the knee in an Italian language journal.[11] The lesion he describes has some radiographic overlap with Köhler's. The anatomical origin, as found upon surgery, was stated to be the origin of the MCL of the knee. Since this journal was taken out of production shortly after, the report failed to get any international attention. Stieda (1869–1945) described the first case series of this calcification.[12] His findings on surgery differed from Pellegrini's because he found the lesion to be situated at the origin of the medial head of the gastrocnemius. Shortly after Stieda's publication, Vogel presented a short case series of the same pathology, providing the first known referral to Stieda's work.[26] Vogel also decided the origin of the medial head of the GM was the source of the lesion, and shortly considers the AM insertion but discards the possibility in the same paragraph. The MCL is not mentioned as possible origin.

Our study shows that since the first description of an ossification on the medial side of the femur by Pellegrini and Stieda, there has been an ongoing debate on the origin of the lesion. The mechanism through which the lesion originates is also unclear, as is the clinical relevance. Opinions range from avulsion and direct trauma to hematoma calcification either inside or outside existing structures. Although this was not the focus of our research, no definite conclusion on the mechanism can be drawn from the literature we studied (Table 1).

The same goes for the anatomic origin of the lesion. A total of 37 articles were found in the literature (Table 2 and Fig. 1). The main structure named as general origin of the calcification is the MCL (54%). But when divided for diagnosis on MRI or surgery, although case numbers are low in these groups, the origin is much more often undecided (50% on MRI) or not related to a structure (29% during surgery). Still, during surgery, the structure is regularly found to be located in the MCL (57%) (Table 3).

*Table 2: Author, year of publication and described origin of the lesion on the medial side of the femur*

| Author | Year | Proposed origin of medial lesion | MRI (N) | Surgery (N) |
|---|---|---|---|---|
| *Köhler*[2] | *1905* | *None stated* | *No* | *No* |
| *Pellegrini*[3] | *1905* | *MCL* | *No* | *Yes (1)* |
| *Stieda*[4] | *1908* | *MG* | *No* | *Yes (1)* |
| Vogel[5] | 1908 | MG | No | No |
| Ewald[28] | 1912 | Ligament or tendon | No | No |
| Pellegrini[29] | 1928 | MCL | No | No |
| Peracchia[16] | 1932 | MCL | No | Yes (1) |
| Bistolfi[30] | 1933 | MCL | No | No |
| Kulowski[17] | 1933 | Not related to a structure | No | Yes (1) |
| Finder[31] | 1934 | MCL | No | Yes (1) |
| Riebel[32] | 1934 | Free from surrounding tissue | No | Yes (1) |
| Dusi[33] | 1935 | MCL | No | No |
| Coltart[9] | 1937 | MCL | No | Yes (1) |
| Bocchi[18] | 1937 | MCL | No | Yes (2) |
| Wiebeck[19] | 1937 | None stated | No | Yes (1) |
| Russell[34] | 1946 | MCL | No | No |
| Finocchi[35] | 1947 | MCL | No | No |
| Chigot[36] | 1953 | MCL or AM | No | No |
| Nachlas[20] | 1954 | No anatomical structure | No | Yes (1) |
| Pendini[37] | 1955 | MCL | No | No |
| Houston[38] | 1960 | MCL | No | No |
| Mennella[21] | 1965 | MCL | No | Yes (2) |
| Houston[15] | 1968 | None stated | No | No |
| Pezzi[39] | 1968 | MCL | No | No |
| Tatò[22] | 1983 | MCL | No | Yes (1) |
| Greïda[40] | 1988 | MCL | No | No |
| Scheib[41] | 1989 | MCL | No | No |
| Wang[23] | 1995 | dMCL | No | Yes (1) |
| Niitsu[24] | 1999 | sMCL | Yes (4) | Yes (1) |
| Mendes[42] | 2006 | MCL and AM | Yes (9) | No |
| Altschuler[43] | 2006 | MCL | No | No |
| Yildiz[44] | 2008 | None stated | No | No |
| McAnally[45] | 2009 | Periostal stripping proximal to MCL | No | No |
| Theivendran[46] | 2009 | MCL, but not exclusively | No | Yes (1) |
| De Vis[10] | 2010 | None stated | Yes (1) | No |
| Yavuz[47] | 2011 | MCL | No | No |
| Majjhoo[11] | 2011 | MCL | No | No |
| Sánchez[48] | 2012 | MCL, but not exclusively | No | No |
| Van Winterswijk[49] | 2012 | MCL or AM | No | No |
| McArthur[27] | 2016 | sMCL and MPFL | Yes (27) | No |

*(MCL = medial collateral ligament, MG = medial gastrocnemius, AM = adductor magnus, VM = vastus medialis, dMCL = deep MCL, sMCL = superficial MCL). The three index publications are in italics.*

*Table 3: Totals of articles for each structure from which the calcification might originate, divided into groups diagnosed with MRI or during surgical treatment.*

| | All articles N (%) | MRI N (%) | Surgery N (%) |
|---|---|---|---|
| MCL | 20 (54) | 1 (25) | 8 (57) |
| GM | 2 (6) | 0 | 1 (7) |
| AM | 0 | 0 | 0 |
| MPFL | 0 | 0 | 0 |
| No structure | 9 (24) | 1 (25) | 4 (29) |
| Undecided | 6 (16) | 2 (50) | 1 (7) |
| Totals | 37 | 4 | 14 |

*Articles naming several structures are labelled undecided (MCL = medial collateral ligament, GM = medial head of gastrocnemius muscle, AM = adductor magnus tendon, MPFL = medial patellofemoral ligament)*

There is a clear lack of consensus, but it is interesting that compared with the general literature, where the MCL is most often named as location of origin for the calcification, this is not always the case with MRI or surgical findings. The pathogenesis of the calcification on the medial side of the knee is not fully elucidated by the current literature. A variety of causes and locations may thus give rise to a calcification on the medial side of the knee.

## Conclusion

The proposed origin of a calcification on the medial side of the knee is diverse. It might be more complex than thought by either Pellegrini or Stieda, who proposed, respectively, the MCL and the GM as origin. Hence, the name Pellegrini–Stieda probably fits this condition, as it comprises differing thoughts on the origin of the lesion. Clinical consequences of the location of an asymptomatic lesion are unclear, but there is evidence that not all calcifications are located in the MCL (both deep and superficial) but might also originate from the GM, MPFL, or AM. MRI is probably an accurate, noninvasive method for future research into the origins of the Pellegrini–Stieda lesion. In case of a symptomatic lesion, the approach and the consequential reconstruction in case of detachment of the injured structure are important for planning the surgery. Therefore, knowledge of the variety of possible origins and proper preoperative imaging of these structures seems imminent.

## Conflict of Interest

None.

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# CHAPTER 3

## The Pellegrini-Stieda lesion of the knee: an anatomical and radiological review

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*Submitted*

**Abstract**

Introduction

The Pellegrini-Stieda lesion is a calcification on the medial side of the knee. The origin of this tissue is controversial. The purpose of our study is to investigate the origin of the Pelligrini-Stieda lesion using conventional radiography.

Material and Methods

Six non-paired fresh-frozen cadaveric knees were used. A surgical approach to the medial side of the knee was performed using the layered approach. The origin of the GM (n=3) or the sMCL (n=3) were marked with a radio-opaque fluid. X-ray analysis was performed by measuring the distance from the proximal part of the marking to the medial tibial plateau, multilayer views and comparison to the original X-rays by Pellegrini-Stieda.

Results

Two out of three markings in both the GM and sMCL group were matched with the correct structure. The images were digitally processed so that the osseous structures became partly transparent.. After overlaying the images we found a random distribution of the markings. The Stieda/GM group had no overlap of the markings at all. Compared to the original images from the publications by Pellegrini and Stieda, no correlation could be found between the original lesions and the markings in our specimens.

Conclusion

Conventional X-ray of the knee could not reproduce a distinction between the sMCL and GM as origins for the P-S lesion as suggested by Pellegrini and Stieda

Keywords:

Pellegrini-Stieda, radiologic study, cadaver study

## Introduction

The Pellegrini-Stieda (PS) lesion is often interpreted as a calcification of the origin of the medial collateral ligament (MCL) of the knee[1–4]. The PS lesion is usually treated conservatively. In selective cases, with symptomatic instability or persistent pain, surgery may be indicated[5]. The origin of this lesion is reported to be either traumatic or due to repetitive micro trauma to the MCL [3,6,7]. However, involvement of other surrounding anatomic structures has also been suggested[8–11]. Analysis of the original publications by Stieda and Pellegrini reveals the that they had already made a distinction between anatomical structures for the lesion[12,13]. Pellegrini described the origin of the MCL of the knee as the location of the calcification[13–15].

In contract, Stieda reported the calcification to be located in the medial part of the origin of the gastrocnemius medial head muscle (GM)[12]. Therefore the PS lesion might not entail one entity but represent a spectrum of traumatic lesions resulting in an ossification on the medial side of the distal femur.

The purpose of the present study is to investigate the possibility of multiple origins – and therefore multiple causes of the PS lesion - by investigating the structures pointed out by Stieda and Pellegrini using their same conventional radiography technique.

## Material and methods

Six nonpaired cadaver legs were used (5 left and 1 right knees). No marked deformities or previous history of trauma or surgery were present.

A medial approach of the knee and the structures under investigation was performed by means of dissecting the skin and subcutaneous fatty tissue by two experienced knee surgeons. The origin of the sMCL and gastrocnemius tubercle (origin of the medial head of the GM)[16] were exposed. The exact location was established in a standardized fashion. First the adductor magnus tendon was identified and traced distally, revealing the adductor tubercle. Starting from the adductor tubercle, the medial epicondyle was identified by proceeding 12.6 mm distally and 8.3 mm anteriorly. From the epicondyle the origin of the sMCL was identified by proceeding 4.8 mm posteriorly and 3.2 mm proximally from the epicondyle. The medial gastrocnemius tubercle was identified by following the medial head of the gastrocnemius[16,17]. (figure 1). After identification, all structures were marked with pins.

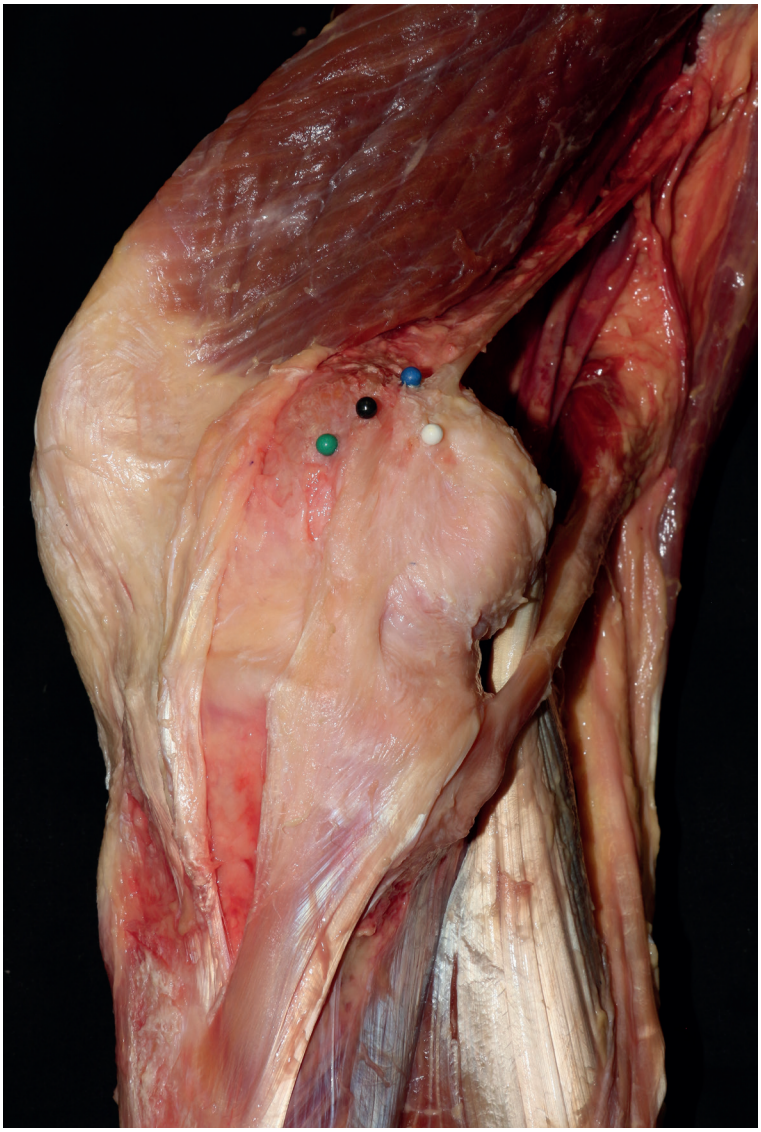

*Figure 1: Medial aspect of the knee, marked are the adductor tubercle (blue), medial epicondyle (green), sMCL insertion (black) and the medial gastrocnemius tubercle (white).*

The knees were randomly assigned to either the sMCL (n=3) or GM (n=3) group. A region of 1 cm. was marked around the origin of the sMCL of the knee or a region of 1 cm from the origin of the medial head of the GM in the distal direction, depending on the assigned group.

The cadaveric knee was placed on a regular X ray table in an AP fashion and the allocated structure (sMCL or medial head of the GM) injected with undiluted barium sulphate suspension (Micropaque® 1000g/l bariumsulphate, Guerbet, Paris, France). (figure 2) The region was infiltrated with as much fluid as possible, leading to an average maximal fluid mass of 1-1,5 ml. If the structure was not sufficiently visible for analysis on the radiological image, additional fluid was administered. The radiologic source was on the anterior side of the knee and the receiver cassette placed underneath the knee in a drawer specifically designed for this cassette. Only the AP direction was used or comparison with the original X-rays in the historical publications by Pellegrini and Stieda.

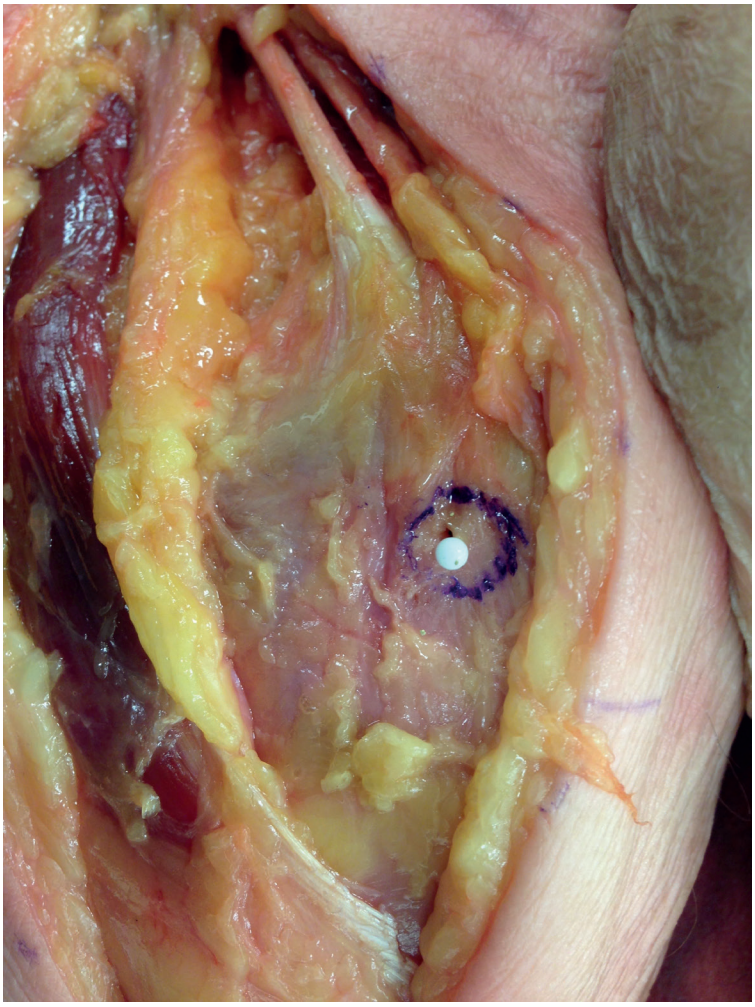

*Figure 2: Approximate area of bariumsulphate infusion, marked with a blue surgical pen.*

*Comparison of specimens*

The radiological images were digitally analysed and compared to the original x-rays/image of the cases described by Pellegrini and Stieda[12,15]. The images were blinded to the analyser.

For reason of better reproducibility, the distance between the most proximal part of the contrast marked region to the medial tibial plateau was determined. It creates a fairly straight line that can easily be measured. This way two groups were formed based on the measured distances. The cadaveric knees that were marked were compared to the original Pellegrini and Stieda x-rays. The observer only knew that in 3 knees the sMCL was marked and that in three other knees the GM was marked. Based on comparability to the original images the observer allocated each cadaveric knee to either the sMCL or the GM group.

Afterwards it was revealed which structure was marked in each cadaveric knee.
By digitally colouring the structures in the x-rays, both the group where the GM was marked and the group were the sMCL was marked could be compared by layering these on top of each other and comparing the distribution of the sulphate suspension (figure 4). Anatomical landmarks (top of the fibula, the notch and the lateral and medial condyle) were used for overlap of the images.

*Comparison of specimens with the original images by Pellegrini and Stieda*

The measuring method as described in the former paragraph was also applied to the original images. In the case of the original Pellegrini image there are two visible calcifications. The most proximal part of the distal calcification as seen on the x-ray was used (figure 3).

In the original images of Pellegrini and Stieda we measured the distance from the proximal part of the lesion to the medial tibial plateau. This way they could be compared to the cadaveric knees. It was established whether there was a correlation of these distances.

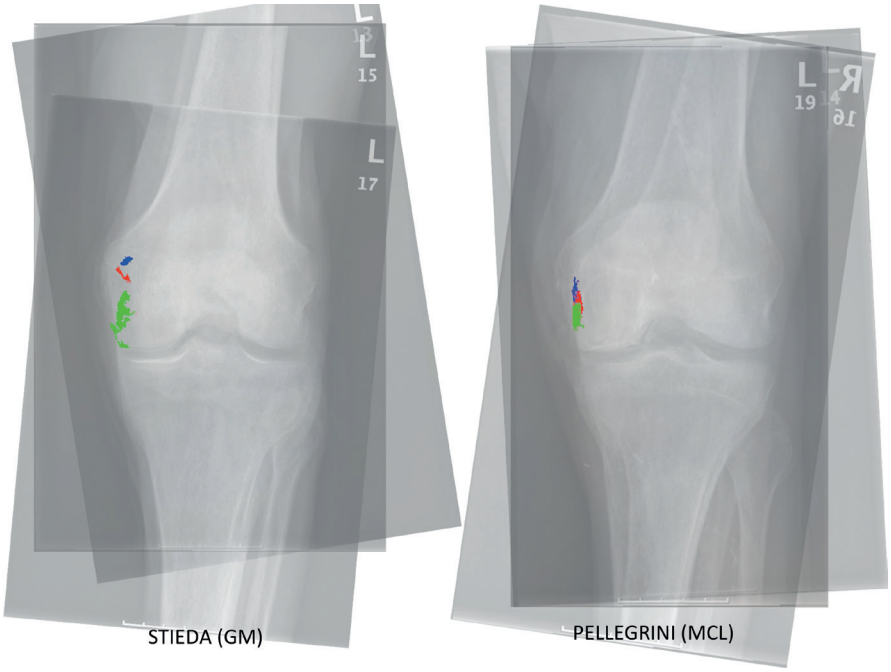


*Figure 3: Original images reproduced with permission from the key publications by Stieda[12] and Pellegrini[13].*

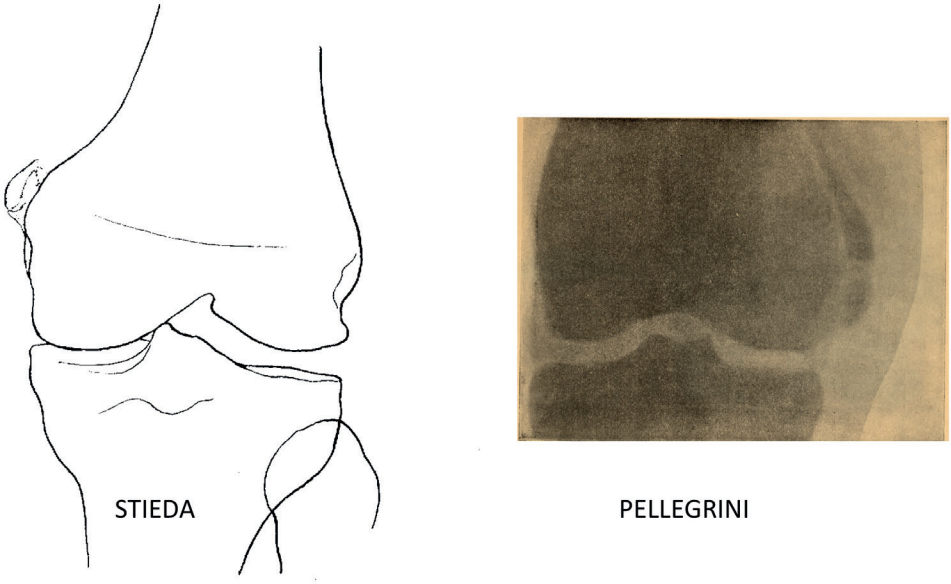


*Figure 4: Overlays of coloured images, 3 samples each.*

## Results

*Comparison of specimens*

The results of the measurements are presented in table 1.There was a match in 66% of the knees (2 out of 3) in each group. This meant 2 out of 3 knees with a marked sMCL were put in the sMCL group and one in the GM group. The average distance in the group thought to contain sMCL marked knees was 33.2 mm (range 30.2-39.0).In the group though to contain GM marked knees the average measured distance was 44.0 mm (range 35.9-51.3).

*Table 1: distances measured from top of marking to the medial tibial plateau and assigned group.*

| Specimen | Distance measured (mm) | Assigned group | Actual group |
|---|---|---|---|
| Pellegrini | *39.4* | *N/A* | *MCL* |
| Stieda | *53.6* | *N/A* | *GM* |
| I | 51.3 | **GM** | **GM** |
| II | 30.2 | **sMCL** | **sMCL** |
| III | 39.0 | **sMCL** | **sMCL** |
| IV | 35.9 | GM | sMCL |
| V | 44.7 | **GM** | **GM** |
| VI | 30.4 | sMCL | GM |

Matches are bold (sMCL = superficial medial collateral ligament, GM = Gastrocnemius muscle)

The results from overlying the images is shown in figure 4. A relative equal distribution in the Pellegrini group and a more diverse distribution in the Stieda group was found. Since there appeared to be no overlap in the GM/Stieda group, quantification of this distribution was not considered reliable.

*Comparison of specimens with the original images*

The overlays were optically compared to the original images (figure 3). The original lesions were found to start more proximal (Stieda) or distal (Pellegrini) than in the specimens of the present study. There was poor similarity of the marked structure in specimens with the calcification in the original images.

## Discussion

Conventional X-ray of the knee could not reproduce the historic distinction between the sMCL and GM as origins for the P-S lesion as suggested by Pellegrini and Stieda. The precise descriptions are as follows:

Pellegrini stated: *'Surgery on 30th April 1905: we opened the ossification and the tumour is visible that it began from the epicondyle, which adheres and goes down along the tibial collateral ligament of the knee. With the chisel blows are given on the top of the tumour adherent to the epicondyle, removing even a thin layer of bone of the femur, then with the scissor we cut the distal end of the tibial collateral ligament keeping a certain distance from the end of ossification*[13]*.'* Stieda stated: *'Thus it concerns in the described preparation without a doubt a rupture of the upper part of the internal epicondyle and we may well suppose also in our clinically observed cases the analogue injury, especially since the position of the shadow in the x-ray fits more with a tearing of the muscle insertion (upper portion of the internal epicondyle) than with a tear of the insertion of the inner sideband (lower portion of the internal epicondyle). Furthermore it is an interesting question, whether the projection comes off by direct force or because of muscle pull*[12]*.'*

Although the location of the origin of sMCL and GM is reported to be very reproducible anatomically[16,17], the present study showed that marking either the sMCL or GM origin did not result in reproducible imaging by the radiography technique of their historical publications.[12,13] By using conventional radiography, it is not possible to distinguish reliably different structures where the calcification might have originated. This may be attributed to the fact that the structures in the cadaver specimens were not injured. Secondary to the mechanism of injury in PS lesions, swelling or hematoma may displace the injured ligament or tendon and subsequently the calcification that can be viewed on X-ray. This notion was also raised by other authors. Mendes et al performed MRI's of the PS lesion and divided them into four types[18]. Although these four types are distinct in their radiological appearance, no definitive anatomical origin could be related to each type, which confirms the findings of the present study. They also found that the MCL could be partially torn or even normal with the PS lesion. As such, one might postulate that the contrast injections without detaching the sMCL of GM insertions on the femur in the present study should be able to replicate the findings by Pellegrini and Stieda. In another MRI study, McAnally et al. hypothesized that periosteal stripping could be the cause of the PS lesion on the medial side of the knee[19]. This would mean no specific structure might give rise to a PS lesion as well, which was not investigated in the present study.

The debate on the origin of the PS lesion remains lively. Recent studies suggest other possible origins of the PS lesion, such as the adductor magnus muscle or the MPFL, in additional to the sMCL[10,20]. Both Niitsu et al. and Wang et al. found the lesion to be located in the MCL upon surgery but the latter authors reported it to be located in the deep MCL while the former authors reported it to be located in the sMCL[21,22]. Other authors did not find lesions to be related to any structure upon surgical removal, adding more confusion to the origin of the PS lesion[23,24]. MRI or surgery may be the most reliable ways of establishing the origin of the calcification on the medial side of the knee. Since clinical relevance is low and surgery not always warranted in cases with asymptomatic lesions, MRI seems the most promising method of further research into the origin of the PS lesion. In the present study, the proximal part of the anatomic contrast marking was deemed to be a reliable location as proximal margin for measurement in relation to to the medial tibial plateau on the AP X-ray. The structure originates proximally and is directed distally in both the sMCL and the GM. When comparing the distances measured in this manner, no clear correlation of the distances measured in the specimens belonging to either the sMCL or GM group could be found.

There are some limitations to the present study. The first is the limited number of studied specimens. A larger amount could have given a more reliable result. The method of injection has not been validated. However, in performing the technique, the region of interest as marked could be infiltrated without excess extravasation outside of this region. Furthermore, it might be questionable whether the exact x-ray setup was used in the present study compared to the past technique by Stieda and Pellegrini. This is due to the evolving technique since the first x-rays as well due to the lack of detailed information of the X-ray settings and technique used in their historic publications. It might be argued that specific location of the origins of the femoral sMCL and GM insertions can more easily reproduced by additional x-ray views or different imaging techniques such as MRI. Considering the aim of the present study to investigate the reproducibility of two possible anatomic lesions for a radiographic PS lesion as suggested by Stieda and Pellegrini, the present study was limited to a comparable radiographic technique as presented in their historical publications.

## Conclusion

Conventional X-ray of the knee could not reproduce a distinction between the sMCL and GM as origins for the P-S lesion as suggested by Pellegrini and Stieda.

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# CHAPTER 4

## Kager's "Bermuda" triangle

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## Introduction

Eponyms are a valuable asset to understanding and remembering medical history. Although the use of eponyms can be a possible source of misunderstanding when discussing diseases or operative procedures, they can provide insight into the early discoveries of certain diseases and the investigators involved in the research. Care should be taken when using eponyms because the original description has often been wrongly interpreted in the years after its discovery or publication. However, eponyms offer a simple help in remembering. With this thought in mind, we sought to unravel the biography of Hans Kager, who is known for naming Kager's triangle, also known as the pre-Achilles fat pad.

## Kager's Early Career

Kager's triangle is the region bordered by the superior part of the calcaneus, the long flexor tendon of the hallux, and the calcaneal tendon. In contrast to, for instance, Francois Chopart or Jacques-Gilles Maisonneuve, who could be researched using the Internet and the sources resulting from such research, the search for Kager's biography was more difficult than we had anticipated. From Kager's original and, for all we know, only publication in 1939, we could derive that at that time he was working at the Hohenlychen Sanatorium in Lychen, Germany.[1] The head of the department at that time was Professor Dr. Karl Gebhardt. No further information was available. From an interview we conducted with eyewitnesses, who had worked at the sanatorium during the period Kager had worked there, we were able to backtrack him to Leipzig, Germany. A book, that had been partially destroyed after the archive containing it had been bombed late in World War II, contained information for all employees of the Hohenlychen Sanatorium and gave us more information on Kager.

Hans Alois Kager was born May 1, 1910 in Leipzig. He studied medicine at Leipzig University from 1929 to 1934. From the archives of the Leipzig University, we found that he had started working at the State Mental Hospital in Zscharau, southeast of Leipzig in 1934. Subsequently, he worked at the County Hospital in Leisnig, also southeast of Leipzig. He completed his study in Leipzig in 1936 and gained his medical doctorate. His thesis was titled "Beitrag zur Kasuistik der 'paranoid-halluzinatorischen' Zustandsbilder bei der Progressiven Paralyse im Gefolge der Malariabehandlung" ("Contribution to the Casuistry of the 'Paranoid-Hallucinatory' States in Progressive Paralysis in the Wake of Malaria Treatment"). Although his thesis was in the field of psychiatry and neurology, his later career and publication was in the field of orthope-

dics. It is probable that Kager started concentrating on orthopedic surgery in his postdoctoral specialization. In 1936, Kager started working as an assistant doctor in the City Hospital in Meerane, in southwestern Saxony. When he started working at the Hohenlychen Sanatorium on September 15, 1938, his last previous work location was noted. The documents from the Hohenlychen Sanatorium revealed that he had been employed with Dr. Praeger in Chemnitz.

**The Hohenlychen Sanatorium**

The Hohenlychen Sanatorium was built in 1902 after the discovery of the tuberculosis bacillus. At that time, the treatment consisted of clean air, a balanced diet, and physical exercise. This treatment was performed in sanatoria in Switzerland; however, to accommodate some of the children in Germany, the Red Cross also built a sanatorium in Lychen. Within a short time, the capacity had been enlarged from 20 to 500 beds. In 1914, the outbreak of the Great War (World War I) meant that no additional construction was performed at the site of the sanatorium. The sanatorium itself was even turned into a general hospital during the war. In 1927, the hygiene commission of the League of Nations met at Hohenlychen. In 1935, Karl Gebhardt became the head of the sanatorium. Because the need for tuberculosis treatment had become less, the sanatorium was developed into 3 new departments: rehabilitation after sport- or work-related injuries, surgery, and internal medicine. The last 2 departments specialized in the treatment of adults with joint and lung diseases. Allegedly, Owen Simpson underwent an operation on his meniscus at the Hohenlychen Sanatorium in 1936.

During World War II the sanatorium was visited by numerous Nazi officials. Even visitors from abroad came to see the sanatorium in working order. The city of Lychen profited greatly from the foreign visitors. A second railway station was even built to facilitate the logistics to and from Berlin. Because the Red Cross was involved in the sanatorium, the symbol for the Red Cross was painted on the roof, and the sanatorium was thus kept safe from any bombardments during World War II. Starting in 1942, experiments were conducted to develop a treatment of wound infections. The allies had already developed penicillin; however, this medicine was not available to the Germans. The subjects for these experiments were inmates of the neighbouring concentration camp for women, Ravensbrück. Some of the experiments were performed at Ravensbrück. Other experiments, including transplantation of bones and nerves, were also conducted. These atrocities, often performed without anaesthesia, among the other crimes against humans performed by doctors at various sites during World War II, were a part of the 4000 charges of the Doctor’s Trial (officially, United States of America v Karl Brandt, et al) at

Nuremberg in 1948. Three people who had worked at the Hohenlychen Sanatorium during World War II were tried and found guilty on several charges, among them Karl Gebhardt. On April 29, 1945, the Red Army occupied the sanatorium without firing a bullet.

**Kager during World War II**

The participation in, or knowledge of, these experiments by Kager is very unlikely. Records from the archives in Berlin of the National Socialist party revealed that Kager became a member of the party on March 23, 1933; on the day the Enabling Act was signed at the Reichstag, the German seat of government. This Act enabled the government to pass laws without parliamentary consent, and the laws could even deviate from the constitution. He joined the German army on October 5,1939, the day Hitler celebrated the defeat of Poland by reviewing the troops that had taken part in the siege of Warsaw. Kager served with the 239 Infantry Division as an assistant doctor in the medical unit. This division took part in the first battle of Kharkov. Just before the battle started, Kager died of a grenade splinter wound, afflicted in Bogoduchow, near Kharkow on October 15, 1941. Kager was buried in a mass grave near Kharkow.

**Kager in Published Studies**

Kager would have fallen into oblivion professionally were it not for colleagues referring to his work on the tear of the calcaneal tendon. Toygar referred to the findings by Kager in his report in 1947 on ruptures of the calcaneal tendon but did not coin the term Kager's triangle.[2] The first time we found the use of the eponym was in a report by Arner et al in 1958.[3] They stated: "It was not until 1939 that the next report on roentgen diagnosis was published, when Kager described what has come to be known as Kager's triangle." In conclusion, elucidating the biography of Kager has not only delivered knowledge of his background, but has also given us an insight in the origin of an eponym. Most striking was that there seems to be no need to fill a library with contributions to (contemporary) medicine to receive an eponym. This can be seen as a stimulus to (young) scientists in all fields of medicine and science. Additional reading can be found in work by Spitz and Waltrich.[4,5]

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# PART II

## The (presumed) fall of eponymous terms

# CHAPTER 5

## Are you positive that the Simmonds-Thompson test is negative? A historical and biographical review

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In our practice, as is true probably all over the world, the Simmonds-Thompson test is the reference standard clinical test used to diagnose rupture of the Achilles tendon. The test, often wrongly referred to as just the "Thompson test," is easy to perform and has high sensitivity and specificity for diagnosing an acute Achilles tendon tear.[1] Interestingly, debate sometimes ensues regarding whether the test is positive when the foot plantar flexes on compression of the calf or is positive when the foot fails to plantar flex. We present a short biography of the surgeons after whom the clinical test is named, a clear description of the test, and the reason the result should be considered "positive" if no plantar flexion of the foot occurs with calf compression.

Franklin Adin Simmonds (October 31, 1910 to July 14, 1983) qualified as a physician in 1935 after studying at Pembroke College, Cambridge, and Saint Thomas' Hospital (Fig. 1). He worked with other notable surgeons, including Bristow, Charnley, and Apley, all of whom have procedures and/or devices named after them.[2–5] During the Second World War, Sir Rowley Bristow became Brigadier in charge of orthopedic services in the British Army, and he recruited Simmonds.[4,6] As Lieutenant Colonel of the Royal Army Medical Corps, Simmonds commanded base hospitals in North Africa, Sicily, France, and the Far East. After the war, he worked at the Royal Surrey County Hospital, Guilford in Pyrford, until he retired in 1975.

*Figure 1. Franklin Adin "Sam" Simmonds (far right with glasses and cigarette). (Reproduced by permission of Surrey History Centre.)*

As a surgeon, Simmonds was known for his dexterity. He was careful in his patient selection for surgery, because he was well aware of the limitations and pitfalls of operative intervention. He was almost pedantically neat and achieved an enviable low complication rate as a result.[4] He was cautious in implementing innovations, but, when proven reliable, he added new techniques and devices to his repertoire and improved them. Simmonds was an infrequent writer, but his contributions were of recognized worth.[4,7–11] He loved his professional work but did not let surgery dominate his life. Sam, as he was known to his friends (since he hated his given names), had many friends within and outside of his medical profession. Often, he and his wife entertained at memorably jolly parties, and his

professional dexterity was mirrored in his plus-one golf handicap.[4] Simmonds passed away in 1983 after a short illness and was survived by his wife and 3 children.[3]

Theodore Campbell Thompson (1902 to 1986) was born in Ishpeming, Michigan (Fig. 2). He was named after his maternal uncle (Theodore) and his paternal uncle (Campbell) (12). He was educated at the University of Michigan. In 1923, during his university years, he suffered a work-related accident while working the night shift at a steel mill. In this accident, his left arm became caught up to his elbow in a planer. He was able to shut the machine off but his calls for help fell unnoticed because of the loud factory noise. He reversed the machine and, with severe soft tissue injury to his arm, freed himself. Although several orthopedic surgeons recommended amputation, a local surgeon was able to save his arm with multiple tendon and skin graft procedures.[12] He went on to receive his MD degree in 1928 and thereafter became an orthopedic surgeon and started a residency at John Hopkins University Hospital. In 1934, he started working at the Hospital for the Ruptured and Crippled, later to be renamed the Hospital for Special Surgery, in New York City. During World War II, Thompson served as a Lieutenant Colonel in the U.S. Army, heading the Amputation Center at Walter Reed Army Hospital, Bethesda, Maryland, outside of Washington, D.C.[12] He was known as a superb teacher, clinician, and surgeon, although he had a reputation for dozing off for short periods of light sleep, after which he would immediately awaken and respond with a pertinent and knowledgeable answer should a question be addressed to him. He made many contributions to orthopedic surgery, especially in the field of post-polio deformities. He was appointed the sixth Surgeon-in-Chief of the Hospital for Special Surgery in 1955 and held the position until 1963.[12]

*Figure 2. Theodore Campbell "Tommy" Thompson. (Courtesy of the Hospital for Special Surgery Archives.)*

Interestingly, Thompson was also not fond of his given names. His father and brothers called him Pete. He himself settled for T. Campbell but was known to his friends and relatives as Tommy. Professionally, his initials T.C.T. were widely recognized. It is said, too, that he was not fond of his picture being taken and was quoted as saying: "I hate mirrors." He was known to enjoy playing tennis, he loved to swim, and he played duets on the piano with his younger sister.[12]

*The Simmonds-Thompson Test*

Simmonds described the test for an Achilles tear in 1957.[7] It consists of 2 signs: (1) the injured foot is in a prone position in less equinus than the uninjured one, and (2) on calf compression, the injured foot fails to plantar flex. In 1955, Thompson observed the exact same findings in a patient with an acute Achilles tendon tear, after which he examined cadavers to determine which tissues had to be disrupted to prevent the foot from plantar flexing. He noted that calf compression in the presence of a tear of 90% of the soleus still resulted in ipsilateral foot plantar flexion. He published these findings in 1962.[13,14]

In general, the result of a clinical test can be called positive or negative, depending on the expected outcome. Because the Simmonds-Thompson test is a diagnostic tool for Achilles tendon rupture and not a test indicative of an intact tendon that is in continuity, the absence of foot plantar flexion on calf compression should correctly be interpreted as a positive test result. In 1992, Scott and al Chalabi further detailed the mechanics of the positive Simmonds-Thompson test result showing that it was indicative of an essentially fully ruptured Achilles tendon.[15] In conclusion, the Simmonds-Thompson test remains the clinical reference standard for the diagnosis of an acute Achilles tendon rupture. It is most striking in the biographies of both men that, although their surnames are associated with this test, neither of them were fond of their given names, according to previous biographers.[4,12] For clarity, and to eliminate any debate related to a misunderstanding of the significance of the test, the Simmonds-Thompson test result should be considered positive when the physical response to calf squeezing is aberrant and the foot fails to plantar flex owing to incongruity of the Achilles tendon, indicative of rupture. It is, in fact, indicative of complete, or nearly complete, rupture of the Achilles tendon.

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# CHAPTER 6

## Eponymous terms in daily practice; a survey among Dutch orthopedic surgeons.

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**Abstract**

*Introduction*

With a survey among Dutch orthopedic surgeons, we try to assess whether eponymous terms are still in use in daily practice. We also tried to find out whether younger generations tend to use them less than our older colleagues.

*Materials and methods*

In a survey consisting of 57 eponymous terms, 67 participants were asked to mark the eponyms they knew and whether they used them in daily practice.

*Results*

No correlation was observed in known/used eponyms or years of experience in 58 completed surveys. Respondents who classified themselves as trauma or general orthopedic surgeons knew or used a significantly higher number of eponyms in daily practice than orthopedic surgeons who classified themselves as spine, upper limb, lower limb, sports or pediatric surgeons.

*Discussion*

Eponymous terms are used frequently in daily practice. Super-specialization might eradicate the general orthopedic surgeon, and the number of eponyms known and used might become smaller and more focused on the super-specialty.

*Conclusion*

Our survey showed that eponymous terms are still used frequently in daily practice among both young and more senior orthopedic surgeons in The Netherlands.

Keywords: Education - Eponymous terms - National survey

## Introduction

The word ‘‘eponym’’ is derived from the Greek, meaning ‘‘named after.’’ An eponymous term can be a structure or condition that has come to bear the name of a person or a location. In case of a person, the person for his/her name becomes an eponym. Everyday examples are ‘‘nicotine’’ and ‘‘saxophone.’’ Examples from medicine are ‘‘Down syndrome’’ or ‘‘Achilles tendon.’’ Altogether there are over 20,000 eponymous terms in the medical profession,[1,2] including the field of orthopedic surgery.[3-7] In the book by Mostofi alone, over 250 eponyms are discussed, and this work does not even cover every single eponym used in orthopedic surgery.[8]

With growing and evolving medical knowledge, eponymous terms risk becoming outdated. At the time an eponym was initially coined the precise mechanism, or condition was not always known. Also, because of the current availability of MRI and CT, clinical findings of earlier days—perhaps assisted by less advanced radiological techniques—may no longer be accurate or have become more nuanced.[9-11]
The aim of our survey was to establish whether eponymous terms are commonly known among orthopedic surgeons, and when known, whether they are used in daily practice.

## Materials and methods

Surveys in the Dutch language were sent to seven large Dutch teaching hospitals. Only consultant orthopedic surgeons were asked to fill out the survey; residents and fellows were not involved. In total 67 orthopedic surgeons were sent surveys. The survey consisted of two questions on experience and surgical region of interest, followed by 57 eponymous terms (supplemental file I). The eponymous terms in the survey were chosen by consensus between the authors. Participants could mark whether they knew the eponymous term and whether they used it in daily practice.

The statistical analysis was performed using SPSS statistics (IBM SPSS statistics, version 24). Analysis was mainly descriptive, presenting frequencies with accompanying percentages. Mean percentages of known eponymous terms per region of interest (general orthopedics, upper extremity, lower extremity and trauma) were calculated and compared with the region of interest chosen by the respondent. Comparisons between the groups with and without a specific region of interest were performed using t-tests. Within each stated region of interest, significance levels were adjusted for multiple testing (0.05/4). Association between years of experience and number of known eponymous terms was assessed using the ANOVA test.

## Results

After removing incomplete surveys, the response rate was 58 out of 67 (87%). Fifty respondents (86%) were in practice less than 20 years. Most common region of surgical interest was the lower extremity (n = 39, 67.2%), followed by trauma (n = 29, 50%). The least chosen region of surgical interest was pediatric orthopedics (n = 11, 19%) (Table 1).

*Table I: General information of respondents*

| | | |
|---|---|---|
| Years in practice | 1-5 | 17 (29,3) |
| | 5-10 | 16 (27,6) |
| | 10-20 | 17 (29,3) |
| | 20-40 | 8 (13,8) |
| Region of surgical interest | Lower extremity | 39 (67,2) |
| | Trauma | 29 (50) |
| | General orthopedics | 27 (46,6) |
| | Upper extremity | 24 (41,4) |
| | Sports orthopedics | 16 (27,6) |
| | Spine | 15 (25,9) |
| | Pediatric orthopedics | 11 (19) |

Girdlestone, Hill–Sachs and McMurray were known to 58 of the respondents (100%), and 53 respondents also used the term in daily practice (91.4%). Duverney (n = 6, 10.3%) and Walther (n = 5, 8.6%) were the least known (Fig. 1). Walther, Albert and Duverney were each used by only two colleagues (3.4%). The number of known eponymous terms was not significantly different between the groups of experience years (Table 2).

*Table II: Percentage of known eponymous terms versus years of experience*

| Years of experience | Percentage of known eponymous terms, mean (95%CI) |
|---|---|
| 1-5 | 72% (65-80) |
| 6-10 | 67% (60-73) |
| 11-20 | 69% (64-75) |
| 21-40 | 63% (56-70) |

Difference between the groups: p=0.31

Respondents with trauma and general orthopedics as region of interest knew and used a significantly higher number of eponyms in daily practice. The proportion of known eponymous term per region of interest was compared to the region the respondent stated his interest was in. Differences were established between the groups that had and hadn't chosen a specific

region of interest (Table 3). Respondents who chose ‘‘upper extremity’’ as region of interest knew significantly ($p<0.01$) more eponymous terms related to the upper extremity. This was also found for the general orthopedics ($p = 0.01$) and trauma ($p = 0.000$) groups. The lower extremity group did not know significantly more eponyms for any region than colleagues who did not state ‘‘lower extremity’’ to be their region of interest. The groups of respondents with interest in pediatric orthopedics, spine and sports were too small to produce a significant difference in the percentage of known eponymous terms, and our survey’s number of eponymous terms for these specialties was relatively small.

*Table III: Proportion of knowledge of eponymous terms per region of interest.*

| Region of Interest (ROI) | Region of eponymous term | % known eponymous terms, mean (95% CI) | | P value* |
|---|---|---|---|---|
| | | ROI + | ROI - | |
| General orthopedics | General orthopedics | 73 (68; 78) | 65 (61; 69) | 0.01 |
| | Upper extremity | 79 (74; 83) | 75 (72; 78) | 0.16 |
| | Lower extremity | 71 (65; 76) | 61 (57; 65) | 0.008 |
| | Trauma | 71 (65; 76) | 60 (55; 64) | 0.002 |
| Upper extremity | General orthopedics | 70 (64; 76) | 68 (64; 72) | 0.47 |
| | Upper extremity | 81 (78; 85) | 73 (70; 77) | 0.002 |
| | Lower extremity | 66 (59; 73) | 65 (61; 70) | 0.81 |
| | Trauma | 66 (60; 73) | 64 (59; 68) | 0.49 |
| Lower extremity | General orthopedics | 68 (64; 72) | 70 (64; 75) | 0.65 |
| | Upper extremity | 75 (72; 78) | 80 (76; 84) | 0.06 |
| | Lower extremity | 65 (61; 70) | 66 (59; 73) | 0.90 |
| | Trauma | 64 (59; 69) | 67 (60; 73) | 0.54 |
| Trauma | General orthopedics | 73 (68; 78) | 64 (61; 86) | 0.003 |
| | Upper extremity | 79 (75; 84) | 74 (71; 77) | 0.06 |
| | Lower extremity | 71 (65; 76) | 60 (56; 65) | 0.004 |
| | Trauma | 71 (65; 77) | 59 (55; 63) | 0.000 |

Comparison of respondents with (ROI +) and without (ROI -) stated region of interest.

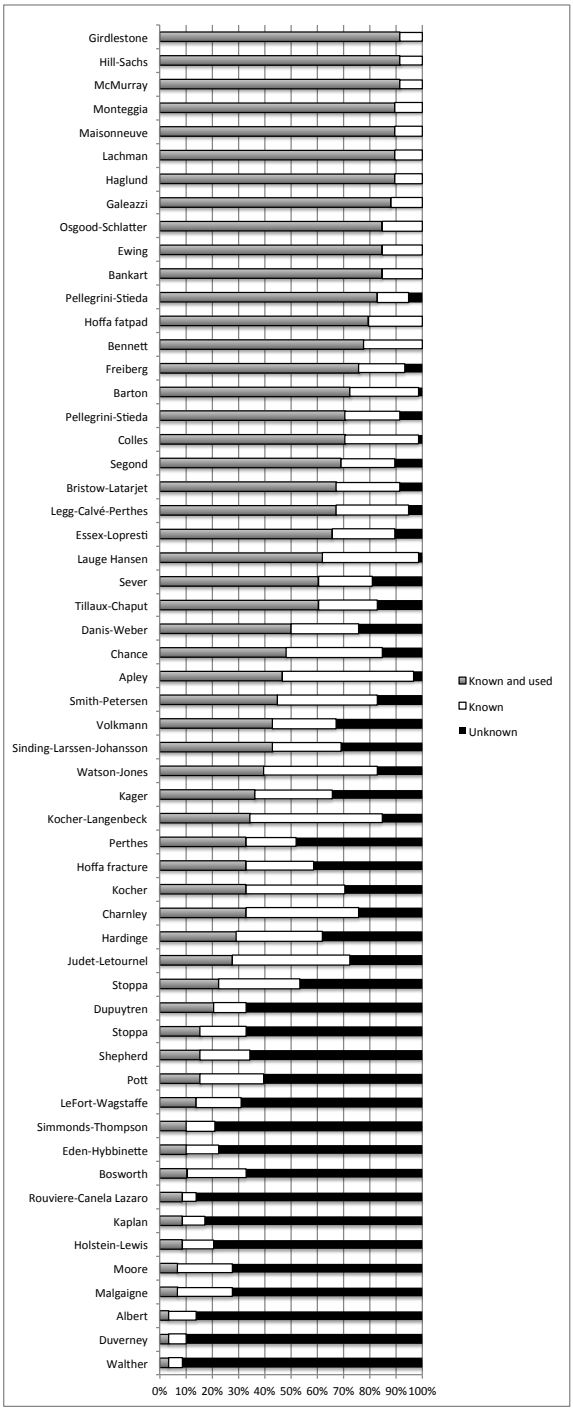


*Figure 1: Distribution of the knowledge of questioned eponymous terms*

## Discussion

Eponymous terms are a constant reason for debate.[12,13] Although very convenient in shorthand, they are very liable to misinterpretation or wrongly used.[14] In academic hospitals we teach our future peers the ropes of our profession, and this survey shows that eponymous terms are used often in this setting. Although in this study we do not have information as to whether the meaning given to an eponymous terms is correct, literature suggests that we often use such terms incorrectly.[12,14-17]

A weakness of our study is that we did not assess the presumed meaning that the respondents have for an eponymous term they know or use. This might have provided insight into the real chances of miscommunication when using eponyms. This has been the subject of another study, showing great variation in presumed meaning of eponymous terms.[18]

When looking upon the results of our survey, respondents with general orthopedics or trauma as region of interest are more prone to use eponymous terms in daily practice. Although this was not the purpose of our survey, it is interesting to see that of the questioned colleagues less than 50% classify themselves as general orthopedic surgeons. This is probably the result of ongoing specialization after becoming, or even during the training to become, an orthopedic surgeon. Also the result that most respondents knew significantly more eponyms in their region of interest, except for the lower extremity group, could indicate that communication between colleagues with different regions of interest might suffer from the use of eponyms.

Although our results are only of a descriptive nature, it is interesting to see the distribution of known and unknown eponymous terms (Fig. 1). The most interesting region of fig. 1 is where there is a near equilibrium between the ‘‘known’’ and ‘‘unknown’’ of a specific eponymous term. This indicates that when this term is used in daily practice, very possibly half of the surgeons will not know what the eponym stands for. This is of course assuming an even distribution of specialists over the different hospitals. In certain clinics a specific eponymous term may be used more often, so all surgeons will be aware of its meaning. In any event, Perthes lesion, Stoppa approach, Hardinge approach and Hoffa fracture should be used with caution.

When the pendulum swings toward the unknown, it is reasonable to assume that if a majority of physicians doesn’t know the meaning of an eponymous term, its meaning will be asked about when the term is used. We nonetheless need to bear in mind that assumption easily leads to error.[19] To be safe, when an eponymous term is used its meaning should be given.

## Conclusion

Eponyms and eponymous terms are most probably here to stay. Since eponymous terms are a sign of the legacy of our predecessors, we generally feel that they should not be abandoned. Eponymous terms are easy shorthand but can easily lead to misunderstandings when not everyone who participates in the conversation knows the meaning of the used terms. Although there is a lot of debate on whether eponymous terms should be used in literature and daily practice or abandoned altogether, there seems to be a high rate of eponymous term usage in Dutch clinics among orthopedic surgeons.[12,13,15,16,20] Out of 57 eponymous terms that were researched, all were used by at least two respondents, which is an indicator that such terms are still widely used in daily practice.

Care should be taken when using an eponymous term, since your peer may not be aware of its meaning or may have another meaning attached to it. In case of doubt, ask whether the meaning is known. If it isn't, be sure to elaborate on the supposed meaning to prevent miscommunication.

It is important to acknowledge the fact that you and your colleagues might not use an eponymous term in the same manner, even though we tend to use eponymous terms in daily practice. The supposed meaning of an eponymous term should be given when we exchange information in our daily practice.

## Acknowledgements

Orthopedic surgeons who completed the survey from Amphia hospital, Slotervaart Hospital, Martini Hospital, Medisch Spectrum Twente, OLVG, Isala clinics and Noordwest hospital group.

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**Supplemental file I: The survey**

SURVEY OF EPONYMS

Years working as an orthopedic surgeon:

☐ 1-5
☐ 5-10
☐ 10-20
☐ 20-40

Area of interest (several options possible):

☐ General orthopedics
☐ Upper extremity
☐ Lower extremity
☐ Pediatric orthopedics
☐ Spine
☐ Sports
☐ Trauma

Check the corresponding square

| Eponym | I know what this term means | I use this term myself |
|---|---|---|
| Albert disease | ☐ | ☐ |
| Apley test | ☐ | ☐ |
| Bankart lesion | ☐ | ☐ |
| Barton fracture | ☐ | ☐ |
| Bennett fracture | ☐ | ☐ |
| Bosworth fracture | ☐ | ☐ |
| Bristow-Latarjet procedure | ☐ | ☐ |
| Chance fracture | ☐ | ☐ |
| Charnley approach | ☐ | ☐ |
| Colles fracture | ☐ | ☐ |
| Danis-Weber classification | ☐ | ☐ |
| Dupuytren fracture | ☐ | ☐ |
| Duverney fracture | ☐ | ☐ |
| Eden-Hybbinette procedure | ☐ | ☐ |
| Essex-Lopresti injury | ☐ | ☐ |
| Ewing sarcoma | ☐ | ☐ |
| Freiberg disease | ☐ | ☐ |
| Galeazzi fracture | ☐ | ☐ |
| Gerdy tubercle | ☐ | ☐ |
| Girdlestone situation | ☐ | ☐ |
| Haglund exostosis | ☐ | ☐ |
| Hardinge approach | ☐ | ☐ |
| Hill-Sachs lesion | ☐ | ☐ |
| Hoffa fracture | ☐ | ☐ |
| Hoffa fatpad | ☐ | ☐ |
| Holstein-Lewis fracture | ☐ | ☐ |
| Judet-Letournel classification | ☐ | ☐ |
| Kager triangle | ☐ | ☐ |
| Kaplan approach | ☐ | ☐ |

| Eponym | I know what this term means | I use this term myself |
|---|---|---|
| Kocher approach | ☐ | ☐ |
| Kocher-Langenbeck approach | ☐ | ☐ |
| Lachman test | ☐ | ☐ |
| Lauge-Hansen classification | ☐ | ☐ |
| Lefort-Wagstaffe fracture | ☐ | ☐ |
| Legg-Calve-Perthes lesion | ☐ | ☐ |
| Maissonneuve fracture | ☐ | ☐ |
| Malgaigne fracture | ☐ | ☐ |
| McMurray test | ☐ | ☐ |
| Monteggia fracture | ☐ | ☐ |
| Moore approach | ☐ | ☐ |
| Osgood-Schlatter | ☐ | ☐ |
| Perthes lesion (shoulder) | ☐ | ☐ |
| Pott fracture | ☐ | ☐ |
| Rouviere-Canela Lazaro ligament | ☐ | ☐ |
| Segond fracture | ☐ | ☐ |
| Sever's disease | ☐ | ☐ |
| Shepherd fracture | ☐ | ☐ |
| Simmonds-Thompson test | ☐ | ☐ |
| Sinding-Larssen-Johansson disease | ☐ | ☐ |
| Smith-Petersen approach | ☐ | ☐ |
| Stieda process | ☐ | ☐ |
| Stieda-Pellegrini lesion | ☐ | ☐ |
| Stoppa approach | ☐ | ☐ |
| Tillaux-Chaput fracture | ☐ | ☐ |
| Volkmann fracture | ☐ | ☐ |
| Walther fracture | ☐ | ☐ |
| Watson-Jones approach | ☐ | ☐ |

# CHAPTER 7

## Are eponyms used correctly or not? A literature review with a focus on shoulder and elbow surgery

MP Somford, RA Nieuwe Weme, CN van Dijk, FFA IJpma, D Eygendaal

*Evid Based Med. 2016 Oct;21(5):163-71*

**Abstract**

*Background*

Eponymous terms are used frequently in daily patient care and scientific literature. They remind us of our predecessors in surgery. It is debatable whether eponymous terms are reliable in case of information transfer. The aim of our study was to investigate whether the original meaning of eponymous terms in shoulder and elbow surgery has been preserved in its use in contemporary literature.

*Objective*

To evaluate whether eponymous terms were used correctly, we analysed the use of frequently encountered eponymous terms from January to December 2014.

*Study selection*

By means of a PubMed search, articles with eponymous terms were identified and analysed for the way an eponymous term was used, and we compared it with the original description. The original description was traced back to the index publication. The use of the eponymous term was scored as similar, divergent or undefined. In the search for eponymous terms, we included those eponymous terms that were used more than 10 times in the English, German and Dutch literature of 2014. 6 eponymous terms were eligible for analysis: Bankart lesion, Bristow-Latarjet procedure, Essex-Lopresti injury of the forearm, Galeazzi fracture, Hill-Sachs lesion and Monteggia fracture.

*Findings*

We analysed 96 articles with the listed eponymous terms, of which 27 (28%) were scored divergent, 32 (33%) undefined and 37 (39%) similar. Bristow-Latarjet scored lowest, with 0% descriptions similar to the original, meaning that all articles had an undefined or divergent eponym, and Essex-Lopresti scored highest with 82% similarity.

*Conclusions*

Eponymous terms in shoulder and elbow trauma and surgery are used inadequately and inconsistently. The use of eponymous terms probably cannot be avoided, but since the majority of eponymous terms are not used properly and understanding of its meaning and content varies from surgeon to surgeon, we should be keen on explaining the meaning of eponymous terms when using them.

## Introduction

When the name of an inventor or discoverer is used to describe a condition, procedure or fracture it is called an eponymous term and the namegiver becomes an eponym. Eponymous terms recognize some of the pioneers in the field. In contrast with an anatomical or developmental description, the original meaning of an eponymous term may have been lost over time. New insights in pathology, pathoanatomy and trauma mechanisms can make the use of historical eponymous terms inappropriate. Adaptations of the original meaning might develop over time and may lead to improper use and understanding of eponymous term. With time, insights into and development of new techniques for diagnosis and operative care change. This can result in modification of eponymous terms.

New nomenclature may even become more appropriate than the historical eponymous term. We are all aware of the need to speak the same language in order to avoid misinterpretation and errors. It is under debate whether eponymous terms contribute to avoid confusion. Misspelling of an eponymous term may make publications on a subject untraceable. This is especially the case with foreign names or words that are used in the English-language literature and vice versa.

With our current research, we tried to establish whether eponymous terms are still used in current literature and whether their original meaning was used.

## Materials and methods

To establish whether eponymous terms are correctly used in current literature, 12 common eponymous terms for traumatic conditions of shoulder and elbow were selected (table 1) on a consensus basis by a committee of experts in the field of upper extremity injuries. A PubMed search was conducted to find articles that used the eponymous terms. The search was limited to journal publication dates between 1 January 2014 and 1 January 2015. Possibly misspelled eponymous terms were included in the search, as were eponymous terms with 10 or more hits. This resulted in six eponymous terms that were eligible for our study. Languages were limited to English, German and Dutch. Systematic literature reviews were excluded. Current concept articles were not excluded.

*Table 1. Search results*

| Eponym/PubMed search term | PubMed hits in 2014 |
|---|---|
| Bankart (Bankert) lesion | 40 |
| Bristow-Latarjet (Laterjet) procedure | 11 |
| Essex-Lopresti forearm injury | 12 |
| Eden-Hybbinette (Hybinette) procedure | 1 |
| Galeazzi (Galeazi) fracture | 11 |
| Hill-Sachs lesion | 31 |
| Kaplan approach elbow | 1 |
| Kocher incision elbow | 1 |
| Lewis-Holstein fracture | 0 |
| Monteggia (Montegia) fracture | 23 |
| Perthes shoulder | 0 |
| Volkmann contracture forearm | 4 |

For the six selected eponymous terms, the original description was traced by means of historical research. The search was conducted by backtracking references up to the original description or analysis of textbooks written by the person whose eponymous term is discussed. After identifying the index publication, the sentence or passage on which the eponymous term is based was carefully identified and used to compare it with the current articles.

On identification, the articles were analysed for the description of the eponymous term itself and then compared with the description in the original publication. This was done by three authors. When the authors were not unanimous, consensus was met after discussion on the score given. If the description in current articles did not meet the original one, the article was scored as ‘divergent’; if there was no clear description of the eponymous term, it was scored as ‘undefined’. If the description was the same as the original manuscript, it was scored ‘similar’. In case that the authors chose to use a modification of the eponymous term but stated the original meaning in their material and methods, the article was scored as ‘similar’ too. No analysis was done to ascertain the quality of research or to interpret the outcomes of the articles. The six eponymous terms selected are (table 1 and figure 1) as follows:

- Bankart (also Bankert) lesion, excluding ‘Bankart procedure’ and ‘bony Bankart’
- Bristow-Latarjet (also Laterjet) procedure
- Essex-Lopresti injury of the forearm
- Galeazzi (also Galeazi) fracture
- Hill-Sachs lesion, excluding reverse Hill-Sachs
- Monteggia (also Montegia) fracture

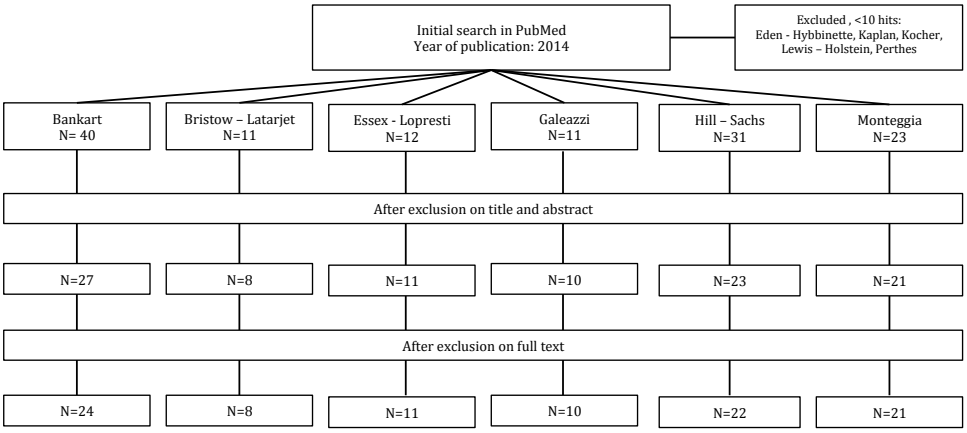


*Figure 1: Flowchart depicting the process of article selection.*

From the original publications, these eponymous terms are defined as follows:
The Bankart lesion (Arthur Sidney Blundell Bankart, 1879–1951) is a detachment of the glenoid ligament from the anterior margin of the glenoid cavity after anterior glenohumeral injury.[1] It should be noted that 'bony Bankart' is an interesting term, as Bankart wrote explicitly that he never had seen recurrent dislocation after glenoid fracture or bony abnormality.[1] Therefore the 'bony Bankart' is excluded from our analysis.

The Bristow-Latarjet procedure (Walter Rowley Bristow, 1882–1947, and Michel Latarjet, 1919–1999) is a difficult eponymous term, since it comprises two surgical procedures that are very much alike but not the same. The distinctive similarity between the Bristow and Latarjet procedures is the use of the coracoid for anterior shoulder stabilisation. Bristow used only the tip of the coracoid and fixed the conjoined tendon to a slit in the subscapular muscle with sutures, as described by Helfet in 1958.[2] Latarjet used the whole coracoid and fixed it with one screw, and raved the anterior shoulder capsule, as he described in 1958.[3] Only stating 'coracoid transposition' is not specific enough to establish the exact technique used, so the articles using this description were scored as 'undefined'.

The Essex-Lopresti injury (Peter Gordon Essex-Lopresti, 1915–1951) of the forearm was described in 1951 as a comminuted radial head fracture with dislocation of the distal radioulnar joint and disruption of the interosseous membrane.[4]
Galeazzi (Riccardo Galeazzi, 1891–1961) in his original articles from 1934 and 1935 described a fracture of the radius with dislocation of the distal radioulnar joint.[5,6] This fracture came to bear his name.

Hill and Sachs (Harold Arthur Hill, 1901–1973, and Maurice David Sachs 1909–1987) described in 1940 a distinctive defect in the humeral head after anterior shoulder dislocation. It is a compression fracture that shows four specific characteristics radiologically: (1) It is at the posterolateral location of the humeral head; only very large defects extend into the greater tuberosity. (2) In external rotation the defect is subtle and often overlooked. (3) The indentation is best seen with the arm in internal rotation and presents as a dense line of 'condensation'. (4) An avulsed fragment from the humerus is practically never present; there may be a small chip from the inferior portion of the glenoid rim.[7] Since Hill and/or Sachs did not describe the reversed type of this lesion, articles on this subject were excluded.

Monteggia (Giovanni Battista Monteggia, 1762–1815) described in 1814 a fracture of the proximal third of the ulna combined with an anterior dislocation of the radial head at the proximal radioulnar joint.[8] A fracture at any site of the ulna with any kind of proximal radial dislocation was described by Hamilton and Malgaigne, but the majority of these fractures are not by definition a Monteggia fracture.[9]

## Results

*Bankart lesion*

Initial search with the keywords 'Bankart lesion' and 'Bankert lesion' produced 40 hits in PubMed, and after exclusion of abstract and full text, 24 were included for final analysis (graph 1).[10–33] The excluded articles were in a different language (two Spanish, one Czech), reported on Bankart repair (3) or bony Bankart lesions (6) or were systematic reviews (4). Nine (37%) articles did not clearly define a Bankart lesion. Four (17%) descriptions were divergent, and the remaining 11 (46%) had a description similar to the original one (table 2).

*Bristow-Latarjet procedure*

Initial search with the keywords 'Bristow-Latarjet procedure' and 'Bristow-Laterjet procedure' produced 11 hits in PubMed, and after exclusion of abstract and full text, 8 remained for final analysis (graph 1).[28,34–40] The excluded articles were systematic reviews. Two (25%) articles did not clearly define a Bristow-Latarjet procedure. Six (75%) descriptions were divergent and none had a description similar to the original one (table 3).

*Essex-Lopresti injury of the forearm*

Initial search with the keywords 'Essex-Lopresti injury of the forearm' produced 12 hits in PubMed, and after exclusion of abstract and full text, 11 remained for final analysis (graph 1).[41–51] The excluded article was a letter to the editor. One (9%) article did not clearly define an Essex-Lopresti injury. One (9%) description was divergent, and the remaining nine (82%) had a description similar to the original one (table 4).

*Galeazzi fracture*

Initial search with the keywords 'Galeazzi fracture' and 'Galeazi fracture' produced 11 hits in PubMed, and after exclusion of abstract and full text, 10 remained for final analysis (graph 1).[52–61] The excluded article was in a different language (French). Four (40%) articles did not clearly define a Galeazzi fracture. One (10%) description was divergent, and the remaining five (50%) had a description similar to the original one (table 5).

*Hill-Sachs lesion*

Initial search with the keywords 'Hill-Sachs lesion' produced 31 hits in PubMed, and after exclusion on abstract and full text, 22 remained for final analysis (graph 1).[15,17,24–29,31,32,62–73] The excluded articles were in a different language (two Spanish, one Czech), reported on reverse Hill-Sachs lesions (3), or were systematic reviews (3). In total, 7 (32%) articles did not clearly define a Hill-Sachs lesion. A total of 5 (23%) descriptions were divergent, and the remaining 10 (45%) had a description similar to the original one (table 6).

*Monteggia fracture*

Initial search with the keywords 'Monteggia fracture' and 'Montegia fracture' produced 23 hits in PubMed, and after exclusion of abstract and full text, 21 remained for final analysis (graph 1).[53,74–93] The excluded articles were in a different language (two Chinese). In total, 11 (52%) articles did not clearly define a Monteggia fracture. A total of 5 (24%) descriptions were divergent, and the remaining 5 (24%) had a description similar to the original one (table 7). In total, 96 articles were analysed, of which 27 (28%) were scored divergent, 32 (33%) undefined and 37 (39%) similar.

*Table 2. Bankart (Bankert) lesion (articles used after exclusion criteria: 24)*

| First Author | Journal | Description of eponym (s/d) |
|---|---|---|
| Armangil[10] | Acta Orthop Traumatol Turc | Glenoid labrum tear (d) |
| Forsythe[11] | Arthroscopy | Undefined |
| Burt[12] | Arthrosc Tech | Undefined |
| Kephart[13] | J Shoulder Elbow Surg | Undefined |
| Shields[14] | Am J Sports Med | Undefined |
| Ozaki[15] | Am J Sports Med | Undefined |
| Belangero[16] | Rev Bras Ortop | Undefined |
| Burks[17] | Arthroscopy | Undefined |
| Dumont[18] | Clin Sports Med | Detachment of the anteroinferior labrum (s) |
| Bernhardson[19] | Am J Sports Med | Anterior labral injury with an avulsed labrum and a ruptured periosteum(s) |
| Larribe[20] | Semin Musculoskelet Radiol | Injury of the anteroinferior attachment of the labrum to the glenoid rim (s) |
| Yamamoto[21] | Am J Sports Med | Labral tissue dissected from the anterior glenoid rim from the 12-o'clock to 6-o'clock position (s) |
| Guermazi[22] | Eur J Radiol | Detached labroligamentous complex from the anterior glenoid (s) |
| Edmonds[23] | J Child Orthop | Anteroinferior (3-6 o'clock) labral tears (s) |
| Zhu[24] | Eur J Ortho Surg Traumatol | Fibrocartilage tear of the anteroinferior edge of the glenoid, periosteum displaced along the front of the scapular neck (d) (this a Perthes lesion) |
| Argintar[25] | Knee Surg Sports Traumatol Arthrosc | Labrum detachment of the glenoid rim from 2-6 o'clock (s) |
| Wolf[26] | J Shoulder Elbow Surg | Undefined |
| Grimberg[27] | Knee Surg Sports Traumatol Arthrosc | Lesion from the 3-6-o'clock position (s) |
| Streubel[28] | J Am Acad Orthop Surg | Anteroinferior detachment of the glenoid labrum; this can be either a soft-tissue or a bony avulsion (d) |
| Witney-Lagen[29] | J Shoulder Elbow Surg | Undefined |
| Moran[30] | Arthrosc Tech | Anteroinferior capsulolabral detachment (s) |
| Horst[31] | Br J Radiol | Labrum or glenoid damage (d) |
| Guity[32] | Med J Islam Repub Iran | Anteroinferior glenoid soft tissue detachment (s) |
| Tudisco[33] | Open Orthop J | Detachment of anterior labrum (s) |

*s=similar, d=divergent*

*Table 3. Bristow-Latarjet (Laterjet) procedure (articles used after exclusion criteria: 8)*

| First Author | Journal | Description of eponym (s/d) |
|---|---|---|
| Sakeb[34] | Mymensingh Med J | Open coracoid bone transfer (d) |
| Nourissat[35] | Orthop Traumatol Surg Res | Transferring the coracoid process, lying down or standing on the anteroinferior aspect of the glenoid, fixed with one screw (d) |
| Giles[36] | J Bone Joint Surg Am | The Bristow procedure transfers only the tip of the coracoid, fixed with a screw. The Latarjet procedure transfers the entire horizontal pillar, fixed with two screws (d) |
| Boileau[37] | Clin Orthop Relat Res | Coracoid bone block is fixed either in the standing position with one screw (Bristow procedure) or in the lying position with two screws (Latarjet procedure) (d) |
| Sastre[38] | Knee Surg Sports Traumatol Arthrosc | Undefined |
| Streubel[28] | J Am Acad Orthop Surg | Latarjet: Coracoid is osteotomised at its base and transferred so that its longitudinal axis is oriented parallel to the face of the glenoid [fixation not stated] (d)<br>Bristow: Undefined<br>(Total scored as undefined) |
| De Figueireido[39] | BMJ Case Rep | Technique with grafts that are removed from the coracoid process and fixed in the anterior margin of the glenoid with two screws (d) |
| Willems[40] | Curr Rev Musculoskelet Med | Undefined |

*s=similar, d=divergent*

*Table 4. Essex-Lopresti injury of the forearm (articles used after exclusion criteria: 11)*

| First Author | Journal | Description of eponym (s/d) |
|---|---|---|
| Martínez Víllen[41] | Chir Main | Longitudinal forearm instability due to loss of humeroradial support, with proximal radial migration and ulnar impaction syndrome (d) |
| Grassmann[42] | Bone Joint J | Fracture of the radial head with shortening of the radius, disruption of the interosseous membrane and dislocation of the distal radioulnar joint (s) |
| Erickson[43] | Pol Orthop Traumatol | Combined radial head fracture, distal radioulnar joint dislocation/subluxation, and longitudinal tear of the forearm interosseous membrane (s) |
| Baghdadi[44] | Clin Orthop Relat Res | Undefined |
| Venouziou[45] | J Shoulder Elbow Surg | Radial head fracture, interosseous membrane rupture, and distal radioulnar joint disruption (s) |
| Elamrani[46] | Surg Radiol Anat. | Radial head fracture (generally comminuted); DRU joint dislocation and tear of all the radioulnar ligaments, including the antebrachial interosseus membrane (s) |
| Wegmann[47] | Acta Orthop | Fracture of the radial head, rupture of the interosseous membrane and disruption of the distal radioulnar joint (s) |
| McGinley[48] | Hand (N Y) | Comminuted radial head fracture associated with longitudinal forearm instability (s) |
| Brin[49] | Tech Hand Up Extrem Surg | Fracture of the radial head, rupture of the interosseous membrane and dislocation of the distal radioulnar joint (s) |
| Hernández-Cortés[50] | Acta Orthop Traumatol Turc | Injury disrupting the radial head, interosseous membrane and distal radioulnar joint (s) |
| Loeffler[51] | J Hand Surg Am | Radial head fracture, interosseous membrane rupture and distal radioulnar joint disruption (s) |

*s=similar, d=divergent*

*Table 5. Galeazzi (Galeazi) fracture (articles used after exclusion criteria: 10)*

| First Author | Journal | Description of eponym (s/d) |
|---|---|---|
| Gould[52] | J Hand Surg Eur | Complete palmar displacement of the distal radial epiphysis and greenstick fracture of the distal ulna (d) |
| Köse[53] | Arch Orthop Trauma Surg | Undefined |
| Saka[54] | Eur J Orthop Surg Traumatol | Undefined |
| Sabat[55] | Indian J Orthop | Undefined |
| Nagy[56] | BMJ Case Rep | Distal radial fracture with volar ulnar dislocation (s) |
| Fillingham[57] | Pol Orthop Traumatol | Fracture of the radial shaft with dislocation of the distal radioulnar joint (s) |
| Takemoto[58] | J Orthop Traumatol | Fractures of the radial shaft with concomitant distal radioulnar joint dislocation (s) |
| Little[59] | Radiographics | Distal radial fractures at any level with associated dislocation of the distal radioulnar joint, resulting in ulnar luxation (s) |
| Fayaz[60] | Handchir Mikrochir Plast Chir | Fracture of the middle to distal third of the radius, associated with DRUJ dislocation and/or instability (s) |
| Saka[61] | Injury | Undefined |

*s=similar, d=divergent*

*Table 6. Hill-Sachs lesion (articles used after exclusion criteria: 22)*

| First Author | Journal | Description of eponym (s/d) |
|---|---|---|
| Ozaki[15] | Am J Sports Med | Notch located at the posterolateral aspect of the humeral head (s) |
| Burks[17] | Arthroscopy | Undefined |
| Patel[62] | Orthop Clin North Am | Compression fracture of the posterolateral aspect of the humeral head (s) |
| Zhu[24] | Eur J Orthop Surg Traumatol | Posterolateral humeral head compression fracture (s) |
| Argintar[25] | Knee Surg Sports Traumatol Arthrosc | Bony defect between posterior edge of the bicipital groove and the plane between the inferior margin of the infraspinatus tendon and the superior margin of the teres minor (s) |
| Gyftopoulos[63] | Am J Roentgenol | Impaction of the posterosuperior margin of the humeral head (s) |
| Omori[64] | Am J Sports Med | Undefined |
| Wolf[26] | J Shoulder Elbow Surg | Bone lesions of the posterior humeral head (s) |
| Agneskirchner[65] | Oper Orthop Traumatol | Humeral bone loss (d) |
| Grimberg[27] | Knee Surg Sports Traumatol Arthrosc | Osseous defects at the humeral head level (d) |
| Streubel[28] | J Am Acad Orthop Surg | Posteromedial impaction of the humeral head (d) |
| McCabe[66] | Arthroscopy | Undefined |
| Chan[67] | J Surg Orthop Adv | Undefined |
| Mohtadi[68] | J Bone Joint Surg Am | Undefined |
| Aslani[69] | Arch Bone Jt Surg | Bone defect in the posterolateral side of the humeral head (s) |
| Di Giacomo[70] | Curr Rev Musculoskelet Med | Bone loss of the proximal humerus (d) |
| Witney-Lagen[29] | J Shoulder Elbow Surg | Undefined |
| Magee[71] | Skeletal Radiol | Undefined |
| Omi[72] | Arthroscopy | Posterolateral humeral head defects (s) |
| Horst[31] | Br J Radiol | Impression fracture on the posterior humeral head (s) |
| Di Giacomo[73] | Arthroscopy | Bone loss of the proximal humerus (d) |
| Guity[32] | Med J Islam Repub Iran | Compression fracture of the posterolateral side of the humeral head (s) |

*s=similar, d=divergent*

*Table 7. Monteggia fracture (articles used after exclusion criteria: 21)*

| First Author | Journal | Description of eponym (s/d) |
|---|---|---|
| Kozin[74] | Instr Course Lect | Undefined |
| Bor[75] | J Pediatr Orthop | Undefined |
| Andjelkoviç[76] | Srp Arh Celok Lek | Fracture of the proximal third of the ulna with anterior dislocation of the radial head (s) |
| Ramirez[77] | J Pediatr Orthop | Undefined |
| Delpont[78] | Orthop Traumatol Surg Res | Undefined |
| Köse[53] | Arch Orthop Trauma Surg | Undefined |
| Mellema[79] | J Hand Surg Am | Undefined |
| Ray[80] | J Pediatr Orthop B | Radial head dislocation with plastic deformity of the ulna (d) |
| Ha[81] | BMC Res Notes | Fracture of the proximal third of the ulna with associated anterior radial head dislocation (s) |
| Rehim[82] | J Hand Surg Am | Fracture of the shaft of the ulna accompanied by anterior dislocation of the radial head (d) |
| Kim[83] | J Pediatr Orthop B | Anterior dislocation of the radial head with plastic deformation of the ulna (d) |
| Little[84] | Orthop Clin North Am | Fracture of the proximal ulna with dislocation of the radial head (s) |
| Datta[85] | J Clin Diagn Res | Undefined |
| Williams[86] | BMC Res Notes | Undefined |
| Laratta[87] | J Orthop Traumatol | Elbow dislocation with concurrent radial and ulnar shaft fracture with distal radioulnar joint disruption (d) |
| Otsuka[88] | J Pediatr Orthop B | Undefined |
| Hagedorn[89] | J Hand Surg Am | Undefined |
| Segaren[90] | Case Rep Surg | Undefined |
| Beutel[91] | Int J Surg Case Rep | Fracture of the proximal ulna with associated radial head dislocation (s) |
| Agrawal[92] | J Pediatr Orthop B | Fracture of the proximal ulna associated with anterior dislocation of the radial head (s) |
| Chagou[93] | Pan Afr Med J | Ulnar fracture and radial head dislocation (d) |

*s=similar, d=divergent*

## Discussion

Although our series are small, it is the first time that the use of eponymous terms is studied in this manner. We limited our search to the year 2014 since our goal is to get a contemporary idea of the use of eponyms and we did not have the intention to do a thorough historical analysis of past use of the chosen eponymous terms. The major finding of our analysis is that the majority of eponymous terms are not used as originally described (61%). There was a large variety in the results, but a 100% match between the original description of the eponymous term and the meaning of the same eponymous term in our study period was not found. For the Bristow-Latarjet procedure none of the recently used eponyms were in concordance with the original. The reason that 75% of the recent descriptions diverged from the original one is because of the complex nature of this eponymous term, which encompasses two techniques. By stating this in the Materials and Methods section and by referring to the used technique, it is possible to still use the eponymous term. A similar description can thus be named, although using only one or maybe a variation of the technique.

The use of eponymous terms in orthopaedic surgery is a well-known mirror of our professional past. Eponymous terms commemorate the pioneers that shaped our profession the way it is practiced today, although it is possible that the eponym is not the one that first described the condition that came to bear his name. This is known as NonOriginal Malappropriate Eponymous Nomenclature (NOMEN).[94] However, in the years following the initial description of certain conditions or surgical techniques, advancing insights changed classifications of diagnoses/pathologies and treatment algorithms. The original description might therefore no longer be appropriate. Often an addition of a 'variant' or 'modification' to the eponymous term is used to show that its meaning has been changed. This is in concordance with Ravitch's statement on eponyms that: '1) The man so honoured was not the first to describe the disease, operation or instrument; 2) He misunderstood the situation; 3) He is generally misquoted; and 4) 1, 2 and 3 are simultaneously true'.[95] This can add complexity to the scientific comparison and discussion. It is important to determine whether the definition is similar when talking, reading or writing about a condition or surgical technique. It has been shown that it might not be the case when using eponymous terms.[96]

The origin of eponymous terms is diverse; it varies from citing the first or most well-known author of the original description in an article[97] or book[98] to using it to honour the person we learnt from.[2] Sometimes the original author himself dedicates the finding to his own name.[99] Independently of origin, eponymous terms are and will remain part of our daily routine.

Eponymous term divergence may be due to a lack of specificity in the description given in the current literature. It would take a larger group with focus on one single eponymous term to investigate this. When a new description appeared for the analysed eponymous terms, our results did not show it as being used by all the authors. Divergent descriptions can be ascribed to a variety of reasons (all tables).

The group that kept the eponymous term undefined poses difficulties. This would only be a theoretical problem if all the other descriptions were similar to the original ones, and (although scientifically it is not appropriate) we could assume that the undefined eponymous term is used similarly to the original description. As this is not the case, we cannot be sure that the articles that did not define the meaning of the eponymous term used it correctly. This makes the research results hard to interpret and apply in our daily practice.

Systematic reviews were excluded, because they report on other (older) articles and do not necessarily use the eponymous term as a distinctive marker themselves. Although excluded for this reason, the article by Trivedi et al is an interesting example of erroneous use of eponymous terms, since it states that a Bankart lesion is defined as glenoid bone loss.[100] Their recommendations should be carefully interpreted, as a search for Bankart lesions for that review will mostly result in articles reporting on labral tears; hence, the definitive article selection should be corrected for this. It probably means that over time adaptation of the Bankart lesion has occurred. In the past, bony avulsion was referred to as a 'bony Bankart' and over time the condition was attributed to Bankart.

A limitation to our study is that we chose a time span of 1 year to search our articles in. We feel though that this results in enough articles we could analyse to answer our research question for this study. Since it was the first time this kind of study was performed, we chose to keep the limit to this time span as a form of pilot. Further studies could direct their search on a limited amount of eponymous terms from the first time they are described up until today to obtain a clear understanding of the use of the eponymous term over time.

Another limit is that the study is restricted to elbow and shoulder surgery; therefore, it might not be applicable to other specialties. The found literature on the debate, whether or not eponyms should be used, is from all kinds of specialties, so the issue seems applicable to general medicine. To research all fields of medicine in one study would be better but unrealistic in our view, since there are more than 20 000 medical eponyms.[101,102]

We recommend describing the lesion in relation to the local (patho)anatomy or trauma mechanism since it is less prone to misinterpretation. When an eponymous structure, lesion or therapy is used, the Materials and Methods section should specify the used anatomical/pathological meaning of the eponymous term. A reference to the original description or the description used should also be given. When the description diverges from the original, it should be stated in what way the eponymous term is being used.

## Conclusion

Eponymous terms in shoulder and elbow trauma and surgery are used inadequately and inconsistently. The use of eponymous terms probably cannot be avoided in scientific literature and in daily patient care, but it should be regarded with care.[103,104] This, since the majority of eponymous terms are not used according to their original description and understanding of their meaning, differs among medics and researchers. Since eponymous terms are hard to abolish in our daily practice and an explanation on their meaning will not always be given, we propose that when used in the scientific literature, the original description or current use should be clarified. The Materials and Methods section of each article should explicitly specify the supposed meaning of the used eponymous term. Only then can we interpret the results correctly.

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# CHAPTER 8

## The Reliability of Orthopaedic Eponymous terms

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**Abstract**

*Background:*
There are approximately 20,000 medical eponymous terms in use today. Familiar eponymous terms serve as shorthand during communication with colleagues. This study tested the reliability of the everyday use of common orthopaedic eponymous terms.

*Methods*:
Using an online survey, 224 orthopaedic surgeons were quizzed on common eponymous terms. The correspondence of each eponymous term with its original description (termed appropriate use) was calculated with 95% confidence intervals. We measured the reliability of the use of eponymous terms using the kappa statistic and the proportion of agreement.

*Results*:
The percentage of appropriate use averaged 45% (ranging from 27% [for the Barton fracture eponymous term] to 75% [for the Sever's disease eponymous term]), with greater misuse among European surgeons. The reliability of the use of eponymous terms was low (kappa, 0.11; proportion of agreement, 68%). The support for using eponymous terms in daily practice was significantly lower among surgeons practicing in North America (63%) than among their colleagues in Europe and South America (80%; $p < 0.001$). Eponymous terms were used more often than anatomical descriptions or classifications.

*Conclusions*:
Using eponymous terms is an inaccurate and unreliable method of communication. Descriptive terms are preferable to eponymous terms.

Eponymous terms, from the Greek word for “named after,” and their derived terms are strongly embedded in our language. For instance, Fahrenheit (Daniel Gabriel Fahrenheit [1686-1736]) or Celsius (Anders Celsius [1701-1744])[1] are commonly used eponymous terms. In contrast, many words, including cereal, nicotine, and boycott, have lost their capitalization and are not easily recognized as eponymous terms[2].

There are approximately 20,000 medical eponymous terms in use today[2,3]. Familiar eponymous terms may provide shorthand for both verbal and written communication with colleagues. Eponymous terms are usually simpler than descriptions, and in some cases, the associated pathophysiology is not known[4]. Additionally, eponymous terms can be confusing if they are used inconsistently or inaccurately[5].

According to Ravitch, there are 3 common flaws that can occur with the use of medical eponymous terms: (1) the person honored was not the first to describe the disease, the operation, or the instrument; (2) he or she misunderstood the situation; or (3) he or she is generally misquoted[6]. In this paper, we explore Ravitch’s third flaw, specifically, whether or not the use of eponymous terms in daily practice corresponds with their original descriptions.

We surveyed an international group of orthopaedic surgeons in order to test for agreement on the meaning of 10 common eponymous terms, and to evaluate agreement on the preferred use of these terms rather than classifications in daily practice and communication. Our primary hypothesis was that inappropriate use of eponymous terms is common. Our secondary hypothesis was that use of eponymous terms is unreliable, as assessed with the kappa statistic and proportion of agreement.

## Materials and Methods

*Study design*

Our institutional review board waived approval for this study. Members of the Science of Variation Group (SOVG, scienceofvariationgroup.org), the Foot and Ankle Platform (FAP, research.ankleplatform.com), and the Shoulder and Elbow Platform (SEP, shoulderelbowplatform.com) were asked to participate in an online survey (see Appendix). The questionnaire assessed (1) the accuracy of a selection of eponymous terms in orthopaedic surgery and (2) agreement on day-to-day use of eponymous terms compared with use of classifications and/or anatomical

descriptions. All participants were invited by e-mail, and their only incentive to participate was group authorship of the present manuscript.

*Survey*

Upon login to the web site, participants received a short description of the study purpose. We designed a survey consisting of 2 parts. Part A was a multiple-choice quiz on the meaning of 10 common eponymous terms: Bankart, Essex-Lopresti, Segond, Sever, Barton, Ewing, Monteggia, Galeazzi, Gerdy, and Hill-Sachs. The reference standard for accuracy in terms of sensitivity was the original description that had been provided by the original author.

The respective original descriptions included Bankart: anteroinferior labral tear[7]; Essex-Lopresti: comminuted radial head fracture with dislocation of the distal radio-ulnar joint and disruption of the interosseous membrane[8]; Segond: avulsion fracture of the proximal lateral tibia[9]; Sever: calcaneal apophysitis[10]; Barton: dorsal rim intra-articular distal radius fracture[11]; Ewing: malignant small round blue cell tumor[12]; Monteggia: a fracture of the proximal third of the ulna in combination with an anterior dislocation of the radial head at the proximal radio-ulnar joint[13]; Galeazzi: any fracture of the radius with any dislocation of the distal radio-ulnar joint[14]; Gerdy: prominence on the lateral side of the proximal tibia where the iliotibial band and tibialis anterior muscle fibers attach[15]; and Hill-Sachs: compression fracture of the posterolateral humeral head, without avulsed fragments[16].

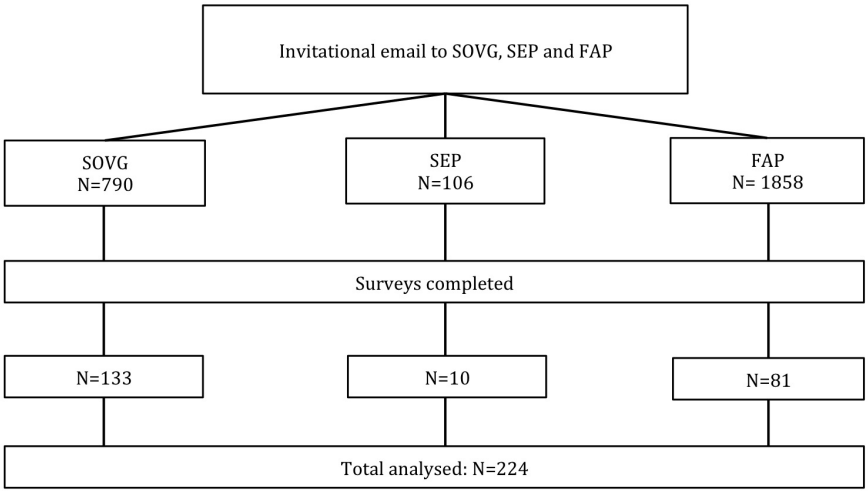
Part B of the survey contained 10 radiographic images of certain conditions or structures, and the participant was asked how he or she would describe this to a colleague, using either (1) an eponymous term, (2) an anatomical description, (3) a classification, and/or (4) other. Some conditions had more than 1 eponymous term to describe it (e.g., Haglund deformity and Mulholland deformity). There was no correction for the type of eponymous term that was chosen if more than 1 was available.

*Participants*

The participants are part of a collaborative of practicing surgeons who study reliability. Among 2,754 surgeons who were sent an e-mail regarding this study, 224 (8%) completed the survey within 17 days (Fig. 1). This does not represent a true response rate because the accuracy of the e-mail addresses was not checked, and many of the people on our lists do not actively participate in the collaborative. Most participants who completed the evaluation were from Europe (47.8%) and North America (30.4%), specialized in trauma (57.1%), and had 10 to 20 years of independent practice (53.6%) (Table I).

*Table 1: baseline characteristics of the respondents (N=224)*

| | | (N) | (%) |
|---|---|---|---|
| Age (years) | 25-30 | 4 | 1.8 |
| | 30-35 | 19 | 8.5 |
| | 35-40 | 36 | 16.1 |
| | 40-45 | 44 | 19.6 |
| | 45-50 | 36 | 16.1 |
| | 50-55 | 39 | 17.4 |
| | 55-60 | 20 | 8.9 |
| | 60-65 | 21 | 9.4 |
| | >65 | 5 | 2.2 |
| Region of practice | Europe | 107 | 47.8 |
| | Asia | 17 | 7.6 |
| | South America | 19 | 8.5 |
| | North America | 68 | 30.4 |
| | Africa | 3 | 1.3 |
| | Oceania | 8 | 3.6 |
| | Missing | 2 | 0.9 |
| Region of interest | Lower extremity | 95 | 42,4 |
| | Upper extremity | 92 | 41.1 |
| | Trauma | 128 | 57.1 |
| | Sport | 54 | 24.1 |
| | Pediatric | 16 | 7.1 |
| | Spine | 10 | 4.5 |
| Experience (years) | Student | 1 | 0.4 |
| | Resident | 9 | 4.0 |
| | 0-5 | 27 | 12.1 |
| | 5-10 | 43 | 19.2 |
| | 10-20 | 120 | 53.6 |
| | 20-40 | 24 | 10.7 |




SOVG – Science Of Variation Group, SEP = Shoulder and Elbow Platform, FAP = Foot and Ankle Platform

*Figure 1: origin of completed surveys.*

*Statistical analysis*

After we had closed the survey, the data were retrieved and analyzed. The description of the population of respondents was performed using frequencies and accompanying percentages. The primary outcome for the first part of the survey was the percentage of questions answered that corresponded with the original description, which was labeled as “knowledge present.” The other answers were labeled as “knowledge absent,” making no distinction between a divergent answer and the answer “I don’t know what […] means.”

The second part of the survey was analyzed to establish the percentage of surgeons who use eponymous terms in daily practice as opposed to other terms (i.e., anatomical description, classification, and/or other).

We calculated the percentage of times that each eponymous term was used in a manner consistent with its original description. The 95% confidence intervals (CIs) were calculated using the formula for the standard error of a proportion, based on a binominal approximation to the normal distribution.

The proportion of agreement was calculated for each answer (in absolute percentages), and was defined as the proportion of participants agreeing with the original description that had been provided by the original author. Also, the agreement in choosing an eponym as a description

was determined with the use of the multirater kappa, as described by Siegel and Castellan[17]. The kappa values were interpreted according to the guidelines of Landis and Koch[18].

Additionally, the continent on which the participant works, his or her area of surgical interest, and his or her years in practice were compared with the percentage of correct answers to assess whether there was a correlation. Comparisons were performed using analysis of variance (ANOVA) tests with post hoc pairwise comparisons (with the Bonferroni correction) in case of significance. A p value of <0.05 was considered significant.

## Results

Eponymous terms were used correctly an average of 45% of the time. None of the eponymous terms were consistently used according to either their original description or a divergent one. No correlation could be found between practice experience or geographic region and use of the original description (Figs. 2 and 3). In Part A of the survey, questions 2 (Essex- Lopresti) and 5 (Barton) had the lowest correspondence with the original description (27.2%). Question 4 (Sever) had the highest correspondence with the original description (74.6%) (Table II).

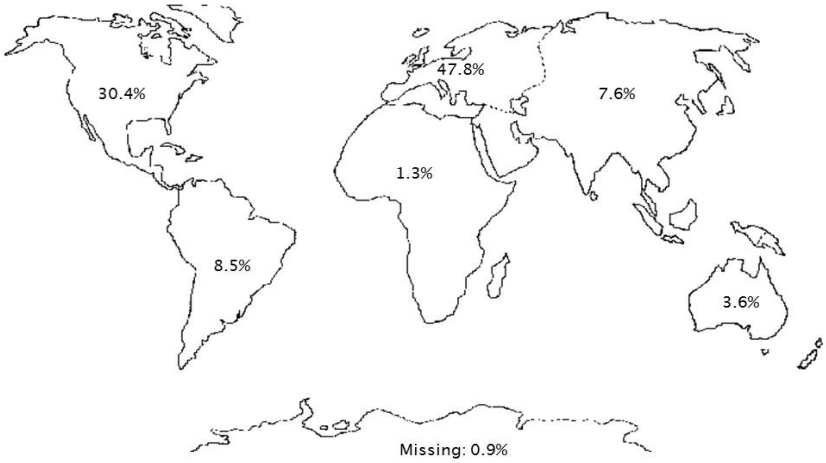
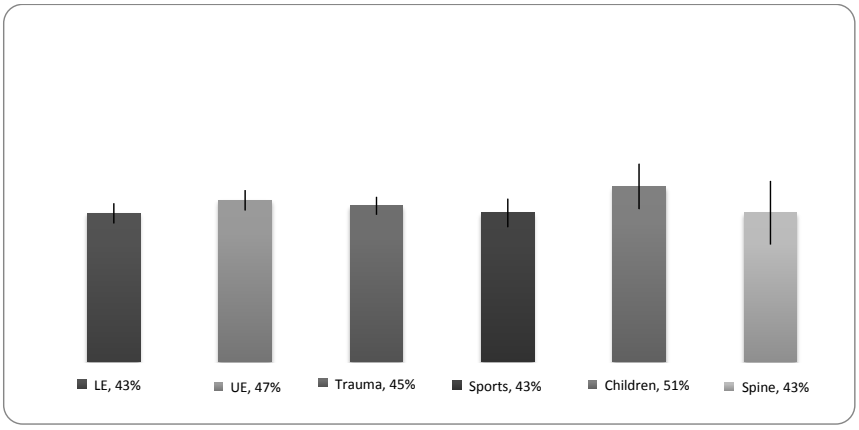



*Figure 2: Geographical distribution of respondents*




A compared with region of surgical interest (LE = Lower Extremity, UE = Upper Extremity) (95% CI)

*Figure 3: Percentage of correct answers in survey*

There was low agreement on the use of eponymous terms (kappa, 0.11; proportion of agreement, 68%). The highest proportion of agreement on an eponymous term was 94.6% for Osgood-Schlatter/Sinding-Larsen-Johansson, and the lowest was 46.6% for Colles fracture (Table III). An eponymous term, rather than an anatomical description or classification, was usually chosen. Surgeons practicing in North America used eponymous terms (rather than descriptive terms or classifications) less often (63%overall) than their colleagues from Europe and South America (80% overall, $p < 0.001$). North American surgeons were more likely than European surgeons to match the original description of the eponymous term, but all of the other comparisons were not significant.

*Table 2: correct answers to survey A questions, sorted from best to worse (95% CI)*

| | |
|---|---|
| 4. What is Sever disease? | 74.6% (68.9-80.3%) |
| 6. What is a Ewing sarcoma? | 66.1% (59.9-72.3%) |
| 7. What is a Monteggia fracture? | 60.3% (53.9-66.7%) |
| 8. What is a Galeazzi fracture? | 44.6% (38.1-51.1%) |
| 1. What is a Bankart lesion? | 42.9% (36.4-49.4%) |
| 10. What is a Hill-Sachs lesion | 38.4% (32.0-44.8%) |
| 3. What is a Segond fracture? | 37.5% (31.2-43.8%) |
| 9. What is Gerdy tubercle? | 29.9% (23.9-35.9%) |
| 2. What is an Essex-Lopresti injury? | 27.2% (21.4-33.0%) |
| 5. What is a Barton fracture? | 27.2% (21.4-33.0%) |

*Table 3: Agreement of using eponymous terms (95% CI)*

| | |
|---|---|
| Osgood-Schlatter/Sinding-Larssen-Johansson | 94.6% (91.6-97.6%) |
| Bennett fracture/Rolando fracture | 89.6% (85.6-93.6%) |
| Girdlestone situation | 86.9% (82.5-91.3%) |
| Haglund deformity/Mulhulland deformity | 78.7% (73.3-84.1%) |
| Bristow-Latarjet procedure | 78.3% (72.9-83.7%) |
| Maisonneuve fracture | 75.2% (69.5-80.9%) |
| Tillaux-Chaput fracture/Reversed Wagstaffe-Lefort fracture | 68.3% (62.2-74.4%) |
| Hoffa fatpad | 65.1% (58.9-71.3%) |
| Freiberg disease | 62.9% (56.6-69.2%) |
| Colles fracture | 46.6% (40.1-53.1%) |

## Discussion

The purpose of our study was to determine whether eponymous terms are used appropriately and reliably in orthopaedics. Eponymous terms are deeply embedded in daily orthopaedic language. If they are unreliable, we may be at risk of miscommunication. We found a high rate of inappropriate use and limited reliability of eponymous terms (more so outside of North America).

This study should be interpreted based on its strengths and weaknesses. The strengths are that the study was performed worldwide, and all of the questionnaires that were returned were complete. There was an even distribution of participants from Europe and North America. Participants from Africa, Asia, and Oceania were lower in number. The proportion of participants with an interest in the lower and upper extremities was similar (42.4% and 41.1%, respectively) (Table I). The weaknesses included the selective, and perhaps biased, choice of the eponymous terms that we used for the study. Although there are >20,000 eponymous terms in medicine, we chose the eponymous terms that tend to be used in our own daily practices, which might not be the ones commonly used in other countries. The number of eponymous terms (10) tested in part A of the survey was also arbitrary. We chose to use this number to make the survey more practical and less burdensome, and selected the terms that are used frequently in our daily practice. Additionally, the design of the study and the phrasing of the descriptions might have influenced the results. Although it was our intention to represent the typical surgeon, most of our participants were in academic practice.

Eponymous terms often were used inaccurately. This is consistent with a recent study that found that the use of eponymous terms in published material is inconsistent, and often differs from the original description[19]. In 96 articles on eponymous shoulder and elbow injuries, on average, 39% (range, 0% to 82%) of the injuries were described similarly to the original description. Waseem et al. studied the way that the Finkelstein test was used in daily practice by 92 orthopaedic surgeons; only 10 of the surgeons could accurately describe and perform the original test as described by Finkelstein[5].

Orthopaedic surgeons in Europe appear to use eponymous terms in daily practice more often than their colleagues in North America (who tend to use more descriptive terms or classifications), and they use them less accurately. It is not clear whether the eponymous terms have evolved to encompass better diagnostic tools or improved knowledge of pathophysiology, if they have lost their intended meaning, or if inaccurate use has become a habit.

Eponymous terms probably are here to stay. They serve as a readily available shorthand, but care should be taken to avoid making management decisions based only on the use of the term. There is a wide variation in the presumed meaning of eponymous terms, making their use a potentially confusing method of communication. It is likely that shorthand names used for physical examination maneuvers might be similarly unreliable and at variance with their original descriptions. In our study, there was no eponymous term that was used consistently. We suggest that eponymous terms be used with caution and, if an eponymous term is used in a scientific report, it should be specifically defined.

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# PART III

## In case eponymous terms are here to stay

# CHAPTER 9

## Eponymous terms in anterior shoulder stabilization surgery

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**Abstract**

Shoulder dislocation and its treatment is probably as old as time. Surgical treatment has gained acceptance recently, especially in recurrent cases. Within roughly the last 100 years numerous treatment strategies have been developed and questions elucidated regarding the entity of shoulder instability.

Shoulder instability holds many eponymous terms. By means of literature and historical research we present the biographical background of some common eponymous terms and the original publication on which those terms are based. We describe the Perthes lesion, Bankart lesion and repair, Hill-Sachs lesion, Bristow-Latarjet procedure and Eden-Hybbinette procedure.

Shoulder instability has been recognized and treated for many centuries. Before the invention of X-rays and the ability to intervene surgically, empirical reduction and time were the only feasible treatment options. Understanding of the pathophysiology of this problem and its corresponding treatment has kept increasing since the 19th century. The originators involved still have their name attached to the different signs and procedures.

Keywords: anterior shoulder instability; Bristow-Latarjet; Eden-Hybbinette; Hill-Sachs; Perthes; Bankart; eponyms

Level of evidence IV

## Introduction

The presumed first description of a dislocation of the shoulder joint is from an Egyptian papyrus known as Ebers' papyrus, dated around 1522 B.C., as well as a picture from an Egyptian grave from 1200 B.C., which may be depicting a reduction method quite similar to Theodor Kocher's (1841-1917). Recently, however, the question has risen as to whether this picture represents a person waking up a fellow worker instead of an attempted reduction.[1] The most detailed early description originates from Hippocrates around 400 B.C. It describes the anatomy, type of dislocation and reduction maneuver as well as the first surgical method for prophylaxis of recurrent dislocation. In time, treatment of shoulder instability became more sophisticated and has evolved to minimally invasive surgical procedures.

Eponyms related to shoulder instability and its surgical treatment will be discussed (Figures 1a and 1b). Each eponym will be accompanied by a biography and the original description based on which the eponym was established. This will improve understanding of the pathology of the condition and provide an insight into those who cleared the way for contemporary shoulder surgeons to treat this condition optimally. The discussed eponymous terms are not an exhaustive list and the choice of terms was based on availability of the original references and biographical information of the original authors.

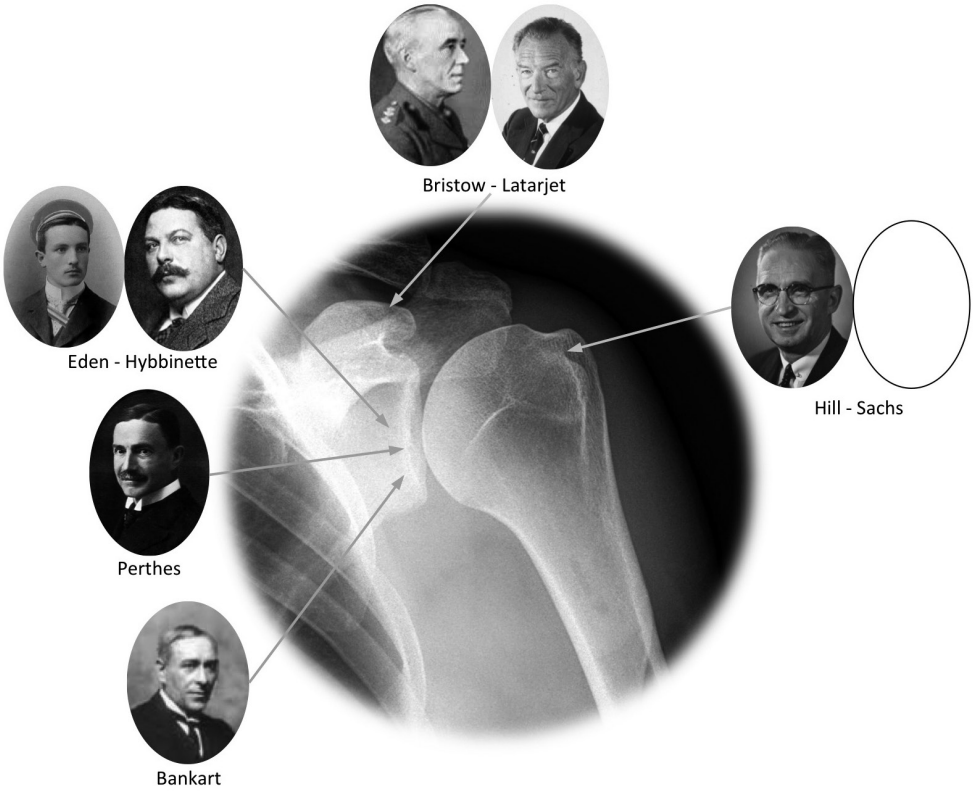
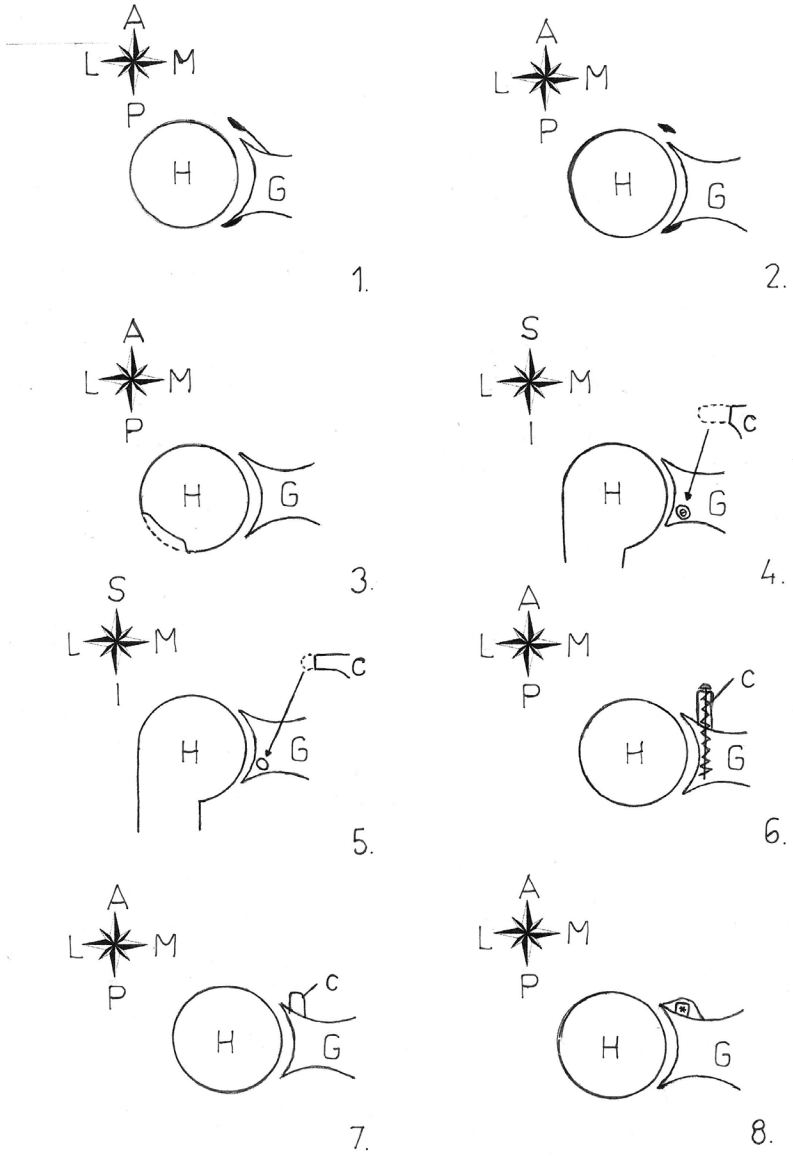



*Figure 1a: Overview of eponyms discussed*




Around compass card: A=anterior, P=posterior, L=lateral, M=medial, S=superior, I=inferior. In drawings: H=humeral head, G=glenoid, c=coracoid. Drawings 1,2,3,6,7 and 8 are in the transverse plane, drawings 4 and 5 in the coronal plane.

1. Perthes lesion, labrum with periostal sleeve attached; 2. Bankart lesion, labrum detached; 3.Hill-Sachs lesion, impression fracture of humeral head; 4.and 6. Latarjet stabilization, total coracoid and screw fixation; 5.and 7. Bristow stabilization, tip of coracoid and no screw fixation; 8. Eden-Hybbinette stabilization, *=bone from tibia (Eden) or iliac crest (Hybbinette)

*Figure 1b: Schematic anatomical overview of eponymous terms discussed, for detailed description see the text.*

**Perthes lesion**

A Perthes lesion refers to an anterior glenohumeral labral tear that occurs when the scapular periosteum remains intact but is stripped medially and the anterior labrum is avulsed from the glenoid but remains partially attached to the glenoid neck by an intact periosteum.[2] Recurrent dislocation occurs due to insufficiency in its function of anchoring the attached inferior glenohumeral ligament.[3]

*Georg Clemens Perthes*

Georg Clemens Perthes (1869-1927) was born in Moers, Germany (Figure 2). After studying medicine in Bonn he received his doctorate in 1891. He started to work in Bonn and Leipzig, and later on worked with Friedrich Trendelenburg (1844-1924).[4] From 1900 to 1901 he was a military surgeon at the German colonial seaport of Tsingtao (nowadays Qingdao), China. In 1910 he became head of the surgical clinic in Tübingen.[4] Perthes was heavily involved in research with Wilhelm Röntgen's newly (1895) discovered X-rays. He pioneered the use of radiology for the treatment of warts, skin cancer and breast carcinomas. Today he is best known for Perthes disease, also known as Legg-Calvé-Perthes disease, a childhood developmental disorder of the hip joint.[5] Perthes took the first X-rays of a patient with this disease in 1898. While in Tsingtao he had the opportunity to conduct radiological studies on the feet of Chinese women that had been subjected to the traditional practice of Lotus foot binding. Perthes died of a stroke in 1927 in Arosa, Switzerland.[4,5]

*Figure 2: Georg Perthes, Wikipedia public domain*

*Clinical implications*

The Perthes lesion is closely related to and often confused with the Bankart lesion.[3,6] In contrast to Bankart lesions, in Perthes lesions the labrum remains attached to the glenoid. This may offer options for nonoperative treatment. Possibly immobilization of the shoulder in external rotation after a first-time traumatic shoulder dislocation is most effective in patients with Perthes lesions showing low-grade plastic deformation compared to Bankart lesions.[7]

**Bankart lesion and repair**

The lesion described by Bankart in 27 cases is a variation of the Perthes lesion. When the humeral head dislocates, the ligaments between the humerus and glenoid stretch and will subsequently avulse the anteroinferior labrum from the glenoid rim.[8] A bony Bankart lesion refers to a bony fracture of the rim of the glenoid. It is believed that bony Bankart lesions occur with the arm in the midrange as the ligaments are not tensioned and the force of trauma will rather cause bony lesions instead. When compared to erosion-type changes of the glenoid rim, it is suggested that the position of the arm and the direction of the trauma mechanism also account for the type of glenoid rim lesion that occurs. It should be noted that "bony Bankart" is a confusing term, as Bankart wrote explicitly that he had never seen recurrent dislocation after glenoid fractures or bony abnormalities.[8] A Bankart repair is done by roughing up the anterior bony margin of the glenoid and reattaching the ligament, labrum and capsule to the anterior margin of the glenoid with sutures.[8]

*Figure 3: Arthur Bankart, with permission of www.historyofsurgery.co.uk*

*Arthur Sydney Blundell Bankart*

Arthur Sydney Blundell Bankart (1879-1951) was born in Exeter as the son of James Bankart, a local surgeon (Figure 3).[9] Bankart became a doctor in 1906. He started his career at Guy's Hospital, becoming a fellow of the Royal College of Surgeons in 1909 and a Master of Surgery at Cambridge one year later.[10] Since 1909 he was employed at the Royal National Orthopaedic Hospital, where he developed his precise and fast surgical skills that so impressed his pupils. He achieved record turnovers when other surgeons went on holiday, and until the end of his career Bankart considered an 8-hour operating session as the ideal way to spend the day.[5,9,10] Apart from orthopedics, Bankart also practiced neurosurgery (spinal and cranial) and pediatric surgery. Being a hard worker, he developed a characteristic walk that was more of a run, as he would rather run up a flight of stairs than wait for the elevator.[9]

During World War I he doubled efforts when he joined the staff of a number of smaller military hospitals too. He also collaborated with Robert Jones in London's newly opened 800-bed Military Orthopedic Centre at Shepherd's Bush. During World War II he kept at it and cared for another 100 temporary beds at Mount Vernon Hospital.[5]

Bankart was a man of great integrity, with no interest in showmanship. He believed that if an idea was good others would soon accept it. Bankart held various positions with the Royal Society of Medicine and was co-founder, secretary and president of the British Orthopedic Association. He was also a honorary member of the French Orthopedic Society. Although he did not easily establish close personal relationships with colleagues, he really enjoyed other people after overcoming his initial shyness. Whereas Bankart was tolerant of error, he suffered no fools.[9,10]

Bankart happily continued working after his retirement in 1946 (two years after his official retirement age), and even went on operating. On April 8, 1951 he operated at Mount Vernon Hospital until 8 PM. On his way home his car got a flat tire; he changed the tire, drove home, and died in his sleep at the age of 71.[5,9,10]

*Clinical implications*

Bankart lesion is a common finding in shoulder instability.[11–13] With persisting instability this lesion is the point of engagement during surgical treatment. The problem lies in distinguishing between reports on true Bankart lesions and bone deficiencies after shoulder luxation.[14–16] Interpretation of reviews on Bankart lesions making this distinction remains a challenge.

**Bristow-Latarjet procedure**

Although there seems to be no definitive description of the Bristow-Latarjet procedure, the operations performed by both Bristow and Latarjet should probably not be considered to be identical. Latarjet originally described his technique of anteroinferior glenoid stabilization by placing a bone block from the coracoid on the glenoid rim after removal of the periost and detachment of the subscapular muscle. The bone block consisted of the entire horizontal pillar of the coracoid and was fixed with one screw, and the subscapularis was reattached, overlapping to create the needed tension.[17,18] The technique of Bristow was described by his student Helfet, 10 years after Bristow had died, and differed only slightly from Latarjet's. The subscapu-

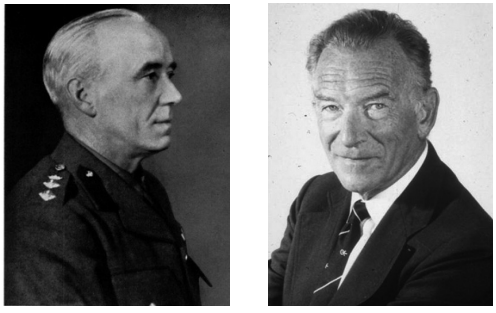


*Figure 4: Walter Bristow, with permission of the British Orthopedic Association, (left) and Michel Latarjet (right), with permission of Gilles Walch*

laris was not detached but opened vertically for 2.5-3 cm and the coracoid bone block was not fixed with screws, only the conjoined tendon was fixed with sutures to the subscapularis. Also, Bristow only used the tip of the coracoid.[19]

*Walter Rowley Bristow and Michel Latarjet*

Walter Rowley Bristow (1882-1947) was born in Bexley, Kent (Figure 4). He was conspicuous for his athletic skills and became close friends with Gathorne Girdlestone (1881-1950) during his medical education at St Thomas' Hospital medical school. After graduating he started working as surgeon at St Thomas' in 1910, where he returned in 1919 after serving as a medical officer in World War I to form the orthopedic department. During the war he was at the Suvla Bay Landing in Gallipoli as part of the Middlesex Yeomanry. During World War II St Nicholas' Home for Crippled Children, where Bristow worked, was used to treat injured servicemen, and in 1948 the hospital was renamed Rowley Bristow Hospital. Funds from the sale of the land were used in 1998 to finance the Rowley Bristow Orthopaedic Unit at St Peter's Hospital in Chertsey. In the interbellum Bristow conducted his practice from 102 Harley Street, which was the scene of bountiful hospitality and legendary lunches and dinners until the Luftwaffe blasted it into ruins in the next war. During World War II he organized the orthopedic sections of the military hospitals in Great Britain as Consulting Orthopaedic Surgeon to the army in the rank of Brigadier.

He was known as a great teacher and therefore loved and remembered by many of his students. One of his aphorisms was "we treat patients, not disease". He married in 1910 and had a son and two daughters.[5] Bristow never described his shoulder stabilizing technique himself, but taught it to his students. Some argue that Bristow himself probably never performed the Bristow procedure.[20,21]

Michel Latarjet (1919-1999) was born in Lyon, France (Figure 4). His father, André Latarjet, was a renowned surgeon and worked as professor of anatomy in Lyon. In 1936 Michel Latarjet became an assistant of anatomy, only to become prosector the next year. He graduated from medical school in 1939. His thesis was on the treatment of bronchiectasis, revealing his interest in thoracic surgery. During World War II Michel Latarjet created a mobile group of surgeons and experienced the need for continuous ambulance service to and from the battlefield, for which he was decorated with the 'croix de guerre' (war cross). In 1942 he became chief of an anatomy department and in 1946 professor of anatomy, at the age of 33. In 1953 Latarjet started his surgical training. His work in the field of thoracic surgery included surgical treatment of dislocating shoulders that ended up close to the thoracic wall. He published his paper on

stabilizing surgery for traumatically dislocated shoulder in 1954. In 1958 he became the head of the thoracic surgery department at Jules-Courmont hospital in Lyon. He continued publishing on anatomy during his entire career and revised his father's anatomical work in 1949, only to publish his own in 1983, in which the best drawings of his father's work were preserved. After suffering a cerebrovascular accident with Broca's aphasia, Michel Latarjet died in 1999.[5,21,22]

*Clinical implications*

Clinical implications of Bristow-Latarjet are hard to establish, as it comprises two techniques.[21,23,24] The technique has evolved and changed almost completely from the original description as far as method of fixation and position of the bone block is concerned.[21,25] Additionally, stabilization is sometimes even performed arthroscopically.[26] Still, the concept of bony stabilization for anterior shoulder instability remains an important modality in the treatment of this condition, with excellent long-term results.[26,27]

## Eden-Hybbinette procedure

Eden described the transplantation of an osseous fragment from the tibia to the anterior border of the glenoid. This was placed under the periost and fixed with sutures or screws. He also described reefing of the capsule upon closure of the joint.[28] Hybbinette described the same method but after a while switched to the use of a graft from the iliac crest. He also put the graft beneath the periost but did not fixate it.[29] He described the defect on the anterior side of the glenoid as being a "Gothic arch"; the false joint space underneath the capsule and subscapularis tendon created an opening for the humeral head to repeatedly dislocate into.

*Rudolf Theis Eden and Oscar Samuel Hybbinette*

Rudolf Theis Eden (1883-1925) was born in Syuggewarden, Germany, as the first child of three (Figure5).[30] Eden went to a private school. After their home burned down in 1893, the family moved to Oldenburg. Eden started studying medicine in 1903 in Marburg and later in Munich, Göttingen and Berlin before returning to Marburg. He graduated in 1908 and worked briefly in Berlin as a resident in internal medicine.][30] He finished his dissertation on lung collapse therapy in 1910. Afterwards he started working as a resident in general surgery in Jena. Eden became a general surgeon in 1913. In 1914 he married Daniela Schott in Jena. With the outbreak of World War I, Eden was sent to the western front in Flanders. His first daughter was born during the war, in 1915. They would have a total of five children.][30] In 1916 he returned to Jena to work in the military hospital. He operated experimentally on various conditions, including

nerve transplantations for nerve injuries, which he practiced on animals.[30] On April 25, 1917 he operated for the first time on a shoulder dislocation with a method he developed himself and would later bear his name. After the war he was asked to join the head of his department to start working in Freiburg im Breisgau.[30] There he developed his surgical skills further and conducted many research projects on animal models. In 1924, at the age of 41, he was invited to work in Innsbruck, but before he was able to do so he got into a bicycle accident in 1925. He broke his cervical spine, which was treated conservatively with a cast. Unfortunately, he died of a complication in the form of a venous embolism in the vena cava.[30]

*Figure 5: Rudolf Eden (left), Wikipedia Commons, and Oscar Hybbinnette (right), author's collection*

Oscar Samuel Hybbinette (1876- 1939) was born in Stockholm (Figure 5).[31] After obtaining his medical degree in 1904 he worked as assistant surgeon for a few years in different hospitals. In 1908 he set up a surgical practice in Stockholm, finally becoming chief surgeon at Hospital Sabbatsberg in Stockholm in 1921. As a trainer of future surgeons he focused on agility of the resident. He often asked the question: "Can this man hold a knife or not".[31] Qualities you needed in order to be hired were the ability to run daily hospital matters with good organization and speed without losing precision and carefulness and, not the least important, a firm handshake. When hired you earned full support. Hybbinette not only wanted to be the chief surgeon, he also tried to be the older experienced comrade that taught and helped the younger gain independence in their actions through support and advice. In 1936 he became professor at the Karolinska Institute.[31]

For his 60th birthday, his friends and students published a collection of 39 cases of treated shoulder instability in the way Hybbinette had developed, 32 of which were operated on by Hybbinette himself. Hybbinette was known as an able surgeon, and praised by his colleagues as a renaissance man.

He maintained high ethical standards. He tried to lower his honorarium for the poorer patients. Allegedly an older lady asked how much the treatment had costed. Hybbinette told her: 75 cents. As a response the lady gave 1 crown and said that that should suffice. The response of Hybbinette was typical for him, giving her 0.25 crowns in return.[31] He was also known to be a very good tenor. He died of a cerebral hemorrhage in Stockholm while singing a solo in the piece “Stillaskuggor”, which is sung to honor the dead. Hybbinette is buried in Österåkers cemetery near Stockholm.[31]

*Clinical implications*

Since the use of the coracoid as anterior stabilizing bone block, the Eden-Hybbinette procedure as primary surgery for shoulder instability seems to have fallen into disuse. Articles found were all from before 2004 and reported on long-term outcome, implying that the procedure is not performed on a large scale anymore.[32,33] Long-term results of the Eden-Hybbinette also seem inferior to the results of the Bristow-Latarjet, especially due to high rates of osteoarthritis.[23] In revision surgery after Bristow-Latarjet procedure there might still be a place for the Eden-Hybbinette or a comparable technique with for instance crista bone, as the coracoid is missing in such cases.[34]

**Hill-Sachs lesion**

Hill-Sachs lesion is described as a defect in the humeral head after shoulder dislocation. Malgaigne noted in 1832 that after anterior shoulder dislocation a bony defect in the humeral head could be present.[35] This was popularized and described in radiographs by Hill and Sachs. They also made the connection between the fracture and persistent instability. It is a compression fracture that has four radiological characteristics:

1) Located posterolaterally in the humeral head, only very large defects extend into the greater tuberosity
2) In external rotation the defect is subtle and often overlooked
3) The indentation is best seen with the arm in internal rotation and presents as a dense line of “condensation”
4) An avulsed fragment from the humerus is practically never present, there may be a small chip from the inferior portion of the glenoid rim[36]

*Harold Arthur Hill and Maurice David Sachs*

Hill (1901-1973) was born in the state of Illinois (Figure 6)[37] and attended high school in Pasadena, California. He became an MD at the University of California Medical School in 1931. Hill set up a private radiology practice in 1935 at St Joseph's Hospital in San Francisco, which closed in 1979. During World War II he served with the US Navy Reserve from 1941 to 1946, rising to the rank of captain.[37] He retired as chief of the radiology department in 1971. He was married and had three children, two sons and one daughter, and was fond of gardening. He died in San Francisco and was inurned at Altadena.[37]Maurice David Sachs (1909-1987) was born in Hartford, Connecticut. He was a radiologist and was affiliated with the San Francisco Department of Public Health. Sachs owned a house in Carmel Highlands that was designed by the architect Olof Dahlstrand. He died in Santa Clara.

*Figure 6: Harold Hill, with permission of San Francisco History Center, San Francisco Public Library*

*Clinical implications*

Attributed to the concept of an engaging deformation of the shoulder joint, identification of a Hill-Sachs lesion is important in recurrent instability. If surgical treatment is indicated a large lesion may also be addressed (remplissage) to lower the redislocation rate after surgical stabilization. Several theories have been developed to determine the relevance of a Hill-Sachs lesion in recurrent shoulder instability.[38–40]

## Discussion

Historically speaking, surgeons have made considerable contributions to the development of the treatment of anterior shoulder instability, and their efforts are still remembered by the pathology or operation that bear their names. The eponymous terms presented by us are not an exhaustive list. The goal of this paper is to familiarize fellow medics with the original descriptions. When using eponymous terms in professional discussions it is important to acknowledge that we might not all have attached the same meaning to a term.[41]

The clinical implications given are concise. These are only meant to align the original findings into perspective with contemporary anterior shoulder instability treatment. No attempt was made to conduct an exhaustive clinical review of each condition or technique.

Nowadays the Bankart repair and the Bristow-Latarjet procedure, or modifications of these techniques, are the most widely accepted techniques to surgically address recurrent shoulder instability. Inherent to each surgical treatment are possible complications, which are inevitable. In the Bankart procedure recurrent instability is frequently observed, especially when patients are followed up to 10 years. Results on recurrent instability following the Bristow-Latarjet procedure are more reliable. This is thought to be partially attributed to the increasing diameter of the glenoid surface, yet the hammock effect by the conjoint tendon might be an even more important factor for its stabilizing success. The Bristow-Latarjet however holds other risks, including a high percentage of patients that develop osteoarthritis to some degree. Other typical complications are bone block osteolysis and screw bending, migration or breakage.[21,23,42] Along with improving equipment, both techniques are still evolving. Whereas the Bankart repair has been mostly performed arthroscopically as a standard for quite some time, the Bristow-Latarjet procedure is now being performed arthroscopically too. These developments will continue, hopefully leading to improvements in long-term results to treat anterior shoulder instability surgically. Inventors of improvements of these and other techniques will emerge and may definitely change the way shoulder instability is treated.[21]

## Conclusion

Anterior shoulder instability is a complex injury that can be treated in various ways. We described common eponymous terms used in relation to this injury and its subsequent repair in order to facilitate peer discussions about the techniques. Knowing the history of inventors and

their surgical techniques may prevent recurrent mistakes. George Santayana stated: “Those who cannot remember the past are condemned to repeat it”. Mark Twain begged to differ and said: “History doesn’t repeat itself, but it does rhyme.” Whichever the case may be, history is an important part of our contemporary surgical practice and eponyms remind us of the pioneers in our profession. Eponymous terms continue to be widely used in “orthopedic language” despite a general trend toward their elimination. Because of their simplicity and their historical references we believe that eponymous terms contribute to the language of orthopedics.

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**Conflict of interest:**
none

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# CHAPTER 10

## Eponyms in elbow fracture surgery

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*J Shoulder Elbow Surg. 2015 Mar;24(3):369-75*

**Abstract**

Eponyms are common in medicine and in orthopaedic surgery. For future reference and historical considerations, we present common eponyms in elbow fracture surgery. We describe in short the biography of the name giver and give, where possible, the original description on which the eponym was based. Whether eponyms should continue to be used is a question that remains unanswered, but if we use them, knowledge of the original description can prevent confusion and knowledge of the historical background sheds light on the interesting roots of our profession.

## Introduction

Eponyms are commonly used in orthopaedic and trauma surgery. The word eponym is derived from the Ancient

Greek language and means ‘‘named after.’’ In general, a surgical procedure, disease, or fracture pattern that is named after the person who discovered it or has described it first becomes an eponym. For several reasons, it can be confusing to use eponyms in orthopaedic or trauma surgery; some surgeons prefer strict criteria and classification systems instead of eponyms for the description of, for example, fracture patterns. As the terminology falls into disuse, the recognition and appropriate use of the eponymous terms can become more and more difficult. Lack of knowledge of the history of orthopaedic surgery among surgeons results in a situation in which the individual’s name and connected history often remain obscure or unknown to the user of the eponym. It is hoped that this report will serve as a reference and a resource for all orthopaedic and trauma surgeons using eponyms in elbow fracture surgery (Fig. 1).

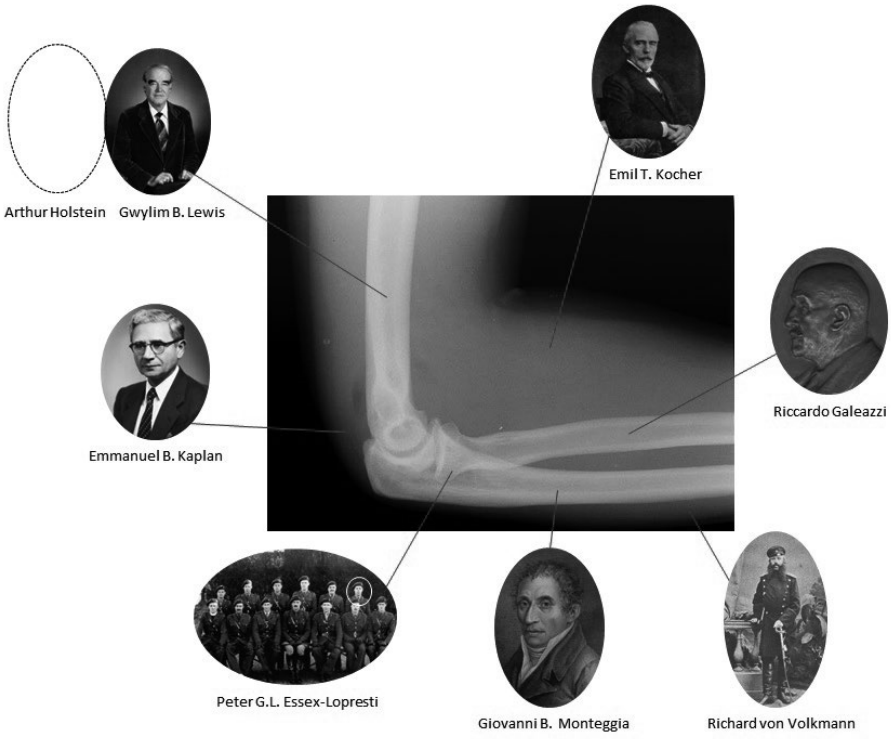


*Figure 1: Overview of the eponyms discussed*

*Holstein-Lewis Fracture*

Arthur Holstein (1914 to October 26, 2000) was born in Waterbury, Connecticut. He moved to San Francisco, East Bay Area, in 1946. He worked at the Alta Bates Hospital in Berkeley, where he lived with his wife, Joan, who was from Lyon, France.[1] Gwylim B. (Bill) Lewis (June 2, 1914, to September 17, 2009) was born in Redlands, California (Fig. 2). His father was originally from Wales, where the name Gwylim is common. Lewis met his wife while studying at the University of Redlands. After graduating, he attended Northwestern University Medical School in Chicago, Illinois. In 1941 he joined the US Navy. During World War II, he completed pilot training and he served aboard the escort carrier USS Savo Island as the ship's flight surgeon. His ship was stationed in the South Pacific and survived among others a kamikaze attack at the Battle of Leyte Gulf (the largest naval battle in World War II and perhaps in history; October 23-26, 1944). He specialized in orthopaedics before leaving the navy in 1948. He used to joke that he specialized in "the skin and its contents." For 40 years, he worked at Alta Bates Hospital, Berkeley. He lived in Berkeley with his wife and children. After retirement from private practice, he consulted until he was 89.[2] First described in 1963, a Holstein-Lewis fracture is a fracture of the distal third of the humerus with possibility of radial nerve entrapment or laceration, resulting in paralysis.[3]

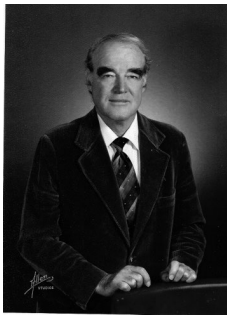

*Figure 2: Gwylim B Lewis (courtesy of Martha Lewis)*

*Essex-Lopresti Injury*

Peter Gordon Lawrence Essex-Lopresti (April 7, 1915, to June 13, 1951) was born in London. Qualifying in 1937 after his training at the London Hospital, he started training to become an anesthesiologist but changed his career in 1940 by becoming a resident in orthopaedic surgery. He joined the army in 1943, specifically the Royal Army Medical Corps. During World War II, he served as a major with the 5th Parachute Brigade in the 225th Parachute Field Ambulance Royal Army Medical Corps of the 6th Airborne Division (Fig. 3). As such, he collected data on injuries sustained with parachute jumps. He reported on the injuries in 20,000 parachute jumps, followed by a report on the treatment of open wounds in trauma.[4,5] During his service, he parachuted hours before D-Day into France and, with his

*Figure 3: Group photo of officers of 225th Parachute Field Ambulance, January 1944. Back row, on the right: Lieutenant P Essex-Lopresti, surgeon specialist (author's collection)*

staff, set up a field hospital where the first casualties of D-Day were treated. He also served in Operation Varsity, the largest airborne operation in history on a single day in one location, to help secure the bridgehead after the Rhine crossing in Germany in 1945. In 1947 Essex-Lopresti was appointed as a consultant at the Birmingham Accident Hospital. While working there, he published his classical work on the radial head fracture that was going to bear his name.[6] Essex-Lopresti died of myocardial infarction at his home in the year he was awarded the Hunterian Professorship for his paper on the treatment of fractures of the os calcis. He was married with 2 children.[7–9]

An Essex-Lopresti injury consists of a radial head fracture with dislocation of the distal radioulnar joint and disruption of the interosseous membrane.[7]

*Volkmann Contracture*

Richard von Volkmann (August 17, 1830, to November 28, 1889) was born in Leipzig (Fig. 4). After attending medical schools in Giessen, Halle, and Berlin from which he graduated in 1854, he started working as a professor of surgery at the University of Halle in 1867. He was a consulting surgeon in the Franco-Prussian War. Seeing disfigurements because of chronic inflammation of joints led him to undertake large reconstructive surgical procedures. Because of this, he is one of the founders of orthopaedic surgery and traumatology. Besides contributions to the medical literature and a variety of medical inventions, he also wrote fairy tales and poems, using the pen name Richard Leander, illustrated by his son. In 1881 he described the contraction of fingers increased compartment pressure, now called a Volkmann contracture. He died in Jena, Germany.[10–14]

*Figure 4: Richard von Volkmann (courtesy of the WFB Verlagsgruppe)*

Volkmann contracture, also known as Volkmann ischemic contracture, is a permanent flexion contracture of the hand at the wrist, resulting in a claw-like deformity of the hand and fingers. It is more common in children. Passive extension of the fingers is restricted and painful. On examination, the fingers are often white or blue and cold and the radial pulse may be absent.[11,12]

*Kocher Incision*

Emil Theodor Kocher (August 25, 1841, to July 27, 1917) was born in Bern (Fig. 5). Despite an interest in art and classical philology, he eventually decided to become a doctor. His dissertation in 1865 had the predicate ‘‘summa cum laude unanimiter.’’ He started working in Zurich, where Theodor Billroth was the director of the hospital. On a journey through Europe, Kocher met with some of the most famous surgeons of that time, among whom were Bernhard von Langenbeck and Louis Pasteur. These connections helped him later in his career when supportive letters from them helped Kocher in becoming professor of surgery in Bern. He received a call to become a professor in Prague, but he used this call to pressure the Swiss government to build a new expanded hospital in Bern, and when this was granted, he decided to stay. To express their joy, the university students held a procession with torchlights in his honor on June 8, 1880. During his 45 years of serving as a professor, Kocher published 249 articles and books in the field of surgery, neurosurgery, and especially thyroid surgery and endocrinology. He gained international recognition with his description of a new technique for the relocation of dislocated shoulders. By referring to Kocher’s Text-Book of Operative Surgery, one could describe the state of surgery at the beginning of the 20th century. In1882 he invented the eponymous clamp, used initially to prevent blood loss during surgery. Being a deep religious person, Kocher attributed all his failures and successes to God. Factors contributing to his success as a surgeon might be antiseptic wound treatment, local anesthesia, and hemostasis. The hemostasis was meticulously performed since Kocher thought that infections could arise from decomposing blood. Kocher received the Nobel Prize in Physiology or Medicine in 1909 and he established the Kocher Institute with the prize money. After performing an emergency operation in the evening of July 23, 1917, Kocher felt unwell and went to bed, working on some scientific notes. After falling unconscious, he died subsequently.

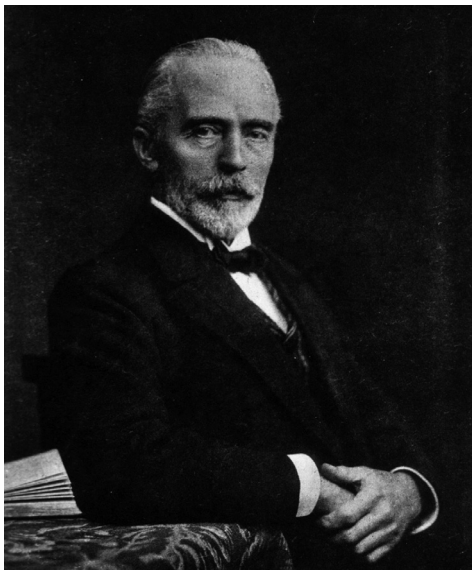

*Figure 5: Emil Theodor Kocher (source: Wikipedia)*

The posterolateral approach to the elbow is called the Kocher incision. It allows exposure of the entire distal humerus, as well as the radial head, radial neck, and biceps tuberosity. The

interneural interval (Kocher's interval) is between the anconeus muscle and the extensor carpi ulnaris muscle. In addition, an osteochondral fracture of the capitellum of the humerus that results in a separation of a semilunar fragment of articular cartilage in the underlying bone is called a Kocher fracture. The fragment is usually displaced into the joint.[15–18]

*Monteggia Fracture-Dislocation*

Giovanni Battista Monteggia (August 8, 1762, to January 17, 1815) was born in Laveno, near the Lago Maggiore (great lake), Italy (Fig. 6). When he was 17 years old, he became an apprentice of surgery at the Great Hospital of Milan. In 1798 he attained his doctorate at the University of Pavia, the oldest university in Europe. He became a surgical assistant and prosector of anatomy in 1790. From 1791 onward, he worked as a prison physician to return to the University of Milan in 1795 as a professor of anatomy and surgery. His work on surgery was highly praised by Antonio Scarpa (1752 to 1832). Monteggia first described the fracture that was to bear his name in 1814. He died supposedly because of syphilis acquired when he cut himself during an autopsy when he was a pathologist. He is buried at the Monumental Cemetery in Milan (Fig. 7).[10,19]

*Figure 6: Giovanni Battista Monteggia (source: Wikipedia)*

A Monteggia fracture-dislocation is a fracture of the ulna in combination with a dislocation of the radial head at the proximal radioulnar joint.[19]


*Figure 7: Giovanni Battista Monteggia's tomb (author's collection)*

*Galeazzi Fracture-Dislocation*

Riccardo Galeazzi (1866 to 1952) dedicated most of his professional life to bone disease (Fig. 8). He worked for 35 years as director of the orthopaedic clinic at the University of Milan, Italy. He directed the oldest periodical devoted to orthopaedic surgery, Archivio di Ortopedia , for 35 years. He wrote works on scoliosis, skeletal tuberculosis, and acute arthritis in the infant, and he reviewed more than 12,000 cases of patients treated for congenital dislocation of the hip. Although Sir Astley Paston Cooper (1768 to 1841) first described the fracture in 1822, because Galeazzi reported his experience with 18 fractures of the here-after described pattern in 1934, his name would be linked to this fracture.[10,19,20]

*Figure 8: Riccardo Galeazzi (courtesy of Museo Gallileo, Florence – Photographic Archives)*

A fracture of the radius with dislocation of the distal radioulnar joint is called a Galeazzi fracture-dislocation.[19,21]

*Kaplan Approach*

Emanuel B. Kaplan (April 25, 1894, to September 20, 1980) was born in Kremenchuk in the Ukraine (Fig. 9). After starting his undergraduate studies in Montpellier, France, he studied medicine both in Paris and in Kharkov. He received his degree in 1916 and served as a physician with the Imperial Russian Army during the Russian Revolution and World War I. During his work with the American Relief Administration as a physician and interpreter (he spoke 5 languages fluently), he was noticed by Herbert Hoover and encouraged to move to the United States, which he did in 1924. He established his private practice in New York in 1927. After his training to become an orthopaedic surgeon at the Hospital for Joint Diseases in New York, he first became an attending orthopaedic surgeon and later on became chief of the Department of Hand Surgery. His anatomical pursuits were conducted at Columbia University, where he was a clinical associate professor of anatomy until his retirement in 1963. Next to his own work, he was also active in translating works of others from, for example, Latin and French to make them available to a broad audience. He especially interested himself in the anatomy and physiology of the extremities. He was known for his humility and modesty. He died at his home.[10]

*Figure 9: Emanuel B. Kaplan (source: US National Library of Medicine)*

To perform the Kaplan (lateral) approach to the proximal radius, a skin incision is made on the lateral aspect of the elbow from the epicondyle extending distally 4 cm toward the ulnar styloid process. The interval between the extensor digitorum communis and the extensor carpi radialis brevis and longus is developed, exposing the underlying capsule, which is incised longitudinally to gain access to the radial head and capitellum.[22]

## Discussion

Whether you are eating your cereal while reading this or you are ready to hit the asphalt after work, you might scratch your sideburns right now and wonder in slight panic whether or not you should boycott eponyms altogether. Probably without knowing it, you just read 5 eponyms (Ceres [cereal], Roman goddess; Leopold von Asphalt; Ambrose Burnside; Pan [panic], Greek god; and Charles Boycott) without having any problem understanding the sentence or separate meaning of the eponyms themselves. This shows that eponyms are part of our language and daily living, and it is paramount that, when used, the meaning of them is clear and the same for everyone who uses them or hears them. Knowing more about the persons behind the eponyms is a way of making them easier to understand and remember. This article provides an overview of eponyms in elbow fracture surgery. The diseases and structures were outlined, as were the lives of their respective discoverers. This article is not an argument for using eponyms or against using them. We provide some detailed information on the people behind the eponyms and explain the original meaning of the eponyms on their first description to result in the correct use when colleagues use these.

For several reasons, it can be confusing to use eponyms in medicine.[23] As the use of well-defined and meticulously built terminology falls into disuse, the recognition and appropriate use of the eponymous terms can become more and more difficult. Knowledge of fracture classification, trauma mechanism, and anatomy has been improved tremendously in the past few decades, which makes some eponyms not applicable anymore.[19] Still, lack of knowledge of the history of orthopaedic surgery among surgeons results in a situation in which the individual's name and history often remain obscure or unknown to the user of the eponym.[24] More importantly, it may lead to confusion in daily clinical practice and peer-to-peer communication because the knowledge of certain eponyms has regressed because of the use of various interpretations, definitions, and classifications of fractures and pathologies. It is important to have international classifications to make sure that scientific discussions concern the same topic and are not easily subject to interpretation or local differences.[19,25,26]

## Acknowledgments

We are grateful for the information provided on Gwylim Lewis by his daughter Martha Lewis. We thank Rebecca Nieuwe Weme for her work on the figures and Marijke Leliveld for correcting the grammar.

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# CHAPTER 11

## The origins and current applications of classic eponymous terms for pelvic and acetabular fractures: a historic review

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*J Trauma Acute Care Surg. 2017 Apr;82(4):802-809*

**Abstract**

We present the historical background of 5 eponymous terms in pelvic and acetabular injury treatment. The eponymous terms Duverney fracture, Malgaigne fracture, Judet-Letournel classification, Kocher-Langenbeck approach and Stoppa approach are discussed. After presenting the original description by the coining author is given. For each eponymous term the current clinical implication is given and discussed afterwards.

## Introduction

Pelvic and acetabular fractures have posed the treating doctors with challenges since the first written history. Allegedly Homer, the well-known Greek author of the Iliad and Odyssey who lived in the 8th century BC, described the first acetabular fracture in the fight between Aeneas and Diomedes during the Trojan war where the latter threw a huge rock against the trochanter of the former resulting in a central dislocation of the femoral head.[1] In ancient times, injuries to the pelvis and acetabulum were often referred to as „hip dislocations", regardless of any associated fractures, because it was almost impossible to diagnose a fracture in this region by clinical examination alone. Hippocrates, the father of medicine who lived from 460-377 BC, used various manoeuvres and a traction table to reduce the hip and the possible associated fractures. However, pelvic and acetabular fracture recognition and stabilization was still in its early stages until the beginning of the 20th century.[2] Advances in medicine including the introduction of anesthesia by Morton in 1846, the founding of antisepsis by Pasteur and Lister in the 1870"s, and the discovery of x-rays by Roentgen in 1896 paved the way for modern fracture management. The first attempts to treat pelvic and acetabular fractures operatively were performed at the beginning of the 20th century. The Belgian surgeon Albin Lambotte (1866-1955) was one the first surgeons who operated on the pelvis at that time by performing cerclage wire for pubic symphysis disruption and sacral bars for sacroiliac joint dislocation. It was only from the 1960s that the surgical treatment of pelvic fractures became more and more popular. Over time many pioneering physicians have contributed to the knowledge about and the treatment possibilities for pelvic and acetabular fractures. Some of them still have their name attached to the terms that are connected to these types of injuries.

The aim of this article is to identify and discuss some eponymous terms related to fracture type, classification, and the operative approaches for pelvic and acetabular injuries (figure 1). The original sources, which could be associated with these eponymous terms were traced and revisited. In order to learn about our predecessors who were concerned with pelvic surgery in the past, we conducted a concise historical search on each eponym. The Duverney and Malgaigne fractures of the pelvis are specific types of fractures that need their specific mending. From a historical perspective the classification of Judet-Letournel was the main guide in understanding the fracture patterns and mechanisms. Finally to get to the region we are discussing the approaches as described by Kocher-Langenbeck or Stoppa are frequently used today. This article does not compromise all known approaches or fracture types but provides an insight in how the current knowledge of the fractures has evolved and which people contributed to the development of these classifications and fracture patterns.

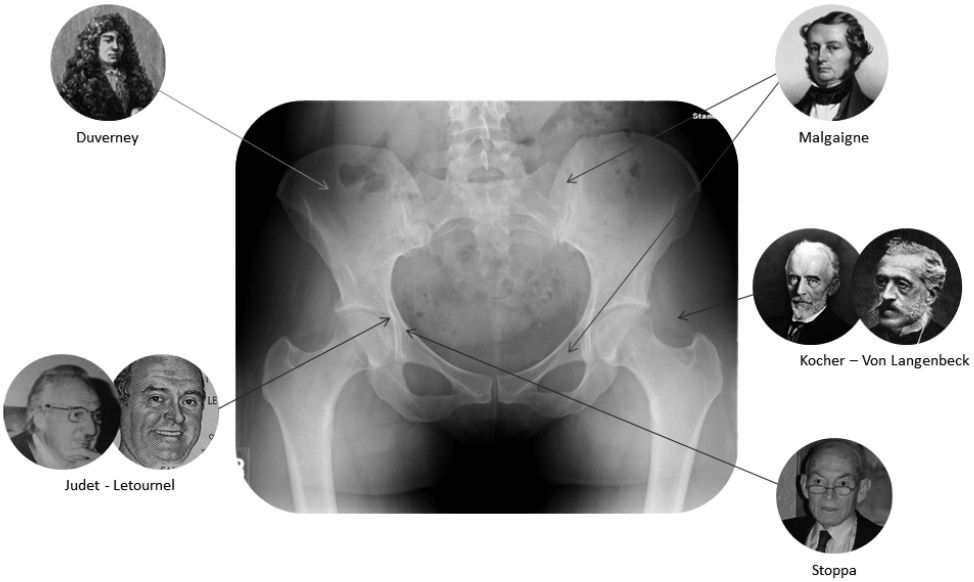


*Figure 1. Overview of eponyms discussed*

**Duverney Fracture**

A fracture of the iliac wing that does not involve the remainder of the pelvis is know as the Duverney fracture.[3] The French physician Du Verney described this type of fracture over 3 centuries ago as follows: “While carrying an iron tire a laborer fell and during the fall the iron tire was broken. Afterwards the patient was unable to walk. He was unable to move his leg and hip, and he was not even able to urinate properly. No fractures were discovered at the hospital where he was brought at that time. The patient was wrapped in a sheep’s skin, which afforded little relief. Unfortunately, after four days the patient died and upon section a transverse fracture of the ilium could be observed and the pelvis was filled with pus”.[3,4]

Joseph-Guichard du Verney or Guichard Joseph du Verney (August 5, 1648 - September 10, 1730) was born in the village Feurs in the Massif Central of southern France. His father was a local doctor. He studied medicine in Avignon for 5 years, starting at the age of 14, and in 1667 he moved to Paris.[5,6] Soon after receiving his medical degree at the age of 19, he was appointed professor of anatomy and surgery at the king‟s medical school by King Louis XIV. In 1680, he was named professor of anatomy at the Jardin du Roi, a position he held for 40 years. During his appointment he made great efforts to advance the knowledge of comparative anatomy. To do so he performed anatomical dissections on specimens from the king’s zoo. The

anatomical demonstrations were open to the public and members of the king's court attended these lessons on a regular basis.[7] Twenty-one years after his death, a student of Du Verney named Senac collected Du Verney's notes and published them in the collected work entitled „Traite de Maladies des Os".[3,5] This extensive two-volume work comprises many descriptions of fractures, dislocations, and bone diseases. This work contains the original description of a patient who suffered Du Verney's eponymous fracture and subsequently died of infection.[3,5–8]

*Clinical implication*

An extra articular fracture of the iliac wing (AO 61-A2.1), or the so-called Duverney fracture, often does not need surgical intervention, unless there is a significant displacement or deformity of the pelvis. However, this type of injury can give rise to serious complications as has been demonstrated in the first case that has ever been described by Du Verney. One should be aware of the possible accompanying injuries with this type of fracture. Perforation of the bowel leading to sepsis, internal iliac artery injury and subsequent shock and nerve damage have been described and should be ruled out.[9,10]

**Malgaigne Fracture**

A fracture of the inferior and superior rami of the pubis with a posterior fracture or dislocation behind the acetabular cavity is defined as a Malgaigne fracture.[2,11] The posterior disruption could involve the sacrum, ilium or sacroiliac joint. The fragment can be caudally of cranially displaced (vertical shear fracture) or can have various inclinations. According to Malgaigne, the most frequent causes of these severe injuries were falling from height, crushing of the pelvis between two carriages, a wheel passing over the hip, and a kick of a horse. He refers to some pelvic specimens, stored in some museum collections, to explain the morphology and certain displacements of the „Malgaigne fracture". Making the right diagnosis solely based on clinical findings was challenging for him, because x-ray images were not yet available at that time. The first symptoms of these types of fractures were pain, contusion and swelling, impairment or loss of motion in the lower extremity. At the physical examination, he measured the length of the limb and position of the iliac crest and tuber ischii to determine the extent of the injury. To ascertain the relations of the fracture fragments, he sometimes had to put one hand on the crista ilii, while the forefinger of the other, passed into the vagina or rectum and presses upon the tuber ischii. If any displacement, such as overlapping of the posterior by the anterior fragment, was detected, he would attempt to correct it by manual reduction at the same time. At that time these types of pelvic injuries were treated by traction for at least 45-50 days. Some kind of mechanical bed

*Figure 2. Joseph François Malgaigne (1806 – 1865), Fielding, HG. An introduction to the history of medicine: with medical chronology, bibliographic data, and test questions. London & Philadelphia, W.B. Saunders, 1914. (Public domain images)*

was sometimes used to bring the limb down to its normal length. To apply proper traction the thighs were fastened together, the feet were fixed to the footboard, and the body was confined by a loop placed beneath the axillae. You can imagine that is was quite a challenge for Malgaigne to treat these severe pelvic fractures properly.

Joseph Francois Malgaigne (February 14,1806 - October 17, 1865) was born at Charmes-sur-Moselle, Vosges, France (figure 2). He was the son of a former army surgeon, who was a local health officer at that time. At the age of 15, he was send to Nancy to study medicine. He qualified as a health officer at the age of 19 and went to Paris to continue his studies.[12] In 1830, the Polish revolted against the Russian control and Malgaigne drew together a volunteer hospital to accompany the Polish Army. From these efforts he nurtured a lifelong dislike of the cold weather.[12,13]

He was well informed about new developments in medicine. That way he became the first one to use ether narcosis in France, only three months after the first success with this kind of anesthesia in Boston.[12] He often searched for primary sources in literature and read them in the original language, rather than relying on possibly faulty translations.

His most interesting influence on medicine in those days was that he criticized medical practice that was not supported by proper scientific research. One of his reviews included the statement, “The work of mister X contains many things both new and good. Unfortunately the good things are not new, and the new things are not good”.[13]

His most important works were the „Traite des Fractures et des Luxations" (1847), a two volume work with an extensive atlas that exceeded most of the previous discussions on the treatment of fractures.[14] He described a specific type of pelvic fracture, an injury that came to bear his name, at chapter 15 (page 651) of his comprehensive work.[11,15] Malgaigne defined the fracture as „a combination of two vertical fractures, separating one side of the pelvis". He observed that due to visceral injury these severe pelvic fractures can become lethal. But „if life is preserved,

lameness is very apt to ensue, or narrowing of the pelvis, the terrible consequences of which we have just seen." With the latter he refers to a case of a young woman dying two days after giving birth with a history of a healed Malgaigne fracture, which resulted in a fracture of the ischium after violent uterine contractions and delivery of the baby by means of a forceps.[15]

*Clinical implication*

Unstable pelvic ring fractures (AO 61-C1), or the so-called Malgaigne fractures, needs to be addressed by anatomic reduction and stable fixation of the posterior and anterior part of the pelvis. These types of injuries include unilateral complete posterior disruption through the ilium, sacroiliac (SI) joint or sacrum. One or more associated anterior arch disruptions, such as pubis ramus fractures or pubic symphysis disruption, will also be present. The specific techniques of reduction and fixation will depend upon the sites of injury, the fracture pattern and displacement, as well as patient factors and available resources. Regarding the posterior element of these injuries, pure SI joint injuries can be treated with percutaneous iliosacral screw fixation. If a closed reduction of the SI joint cannot be achieved, anterior SI Joint plate fixation might be a suitable alternative. Regarding the anterior element of these injuries, pubic symphysis plate is indicated for symphyseal disruption and/or pubic body fractures. Pubic ramus fractures have several treatment options, including external fixation or pubic ramus screw and plate fixation. However, the most important lesson, already experienced by Malgaigne in the 19th century, is that these injuries can be lethal. Therefore before we proceed with any definitive repairs, the patient must be fully resuscitated and fully evaluated.

**Judet – Letournel classification**

The classification Judet and Letournel was introduced in 1964 and is based on a landmark paper in the Journal of Bone and Joint Surgery about 173 patients with an acetabular fracture of which 129 were treated operatively.[16] The reason to start operating on these types of fractures was the disappointing results of conservative treatment. The French physicians Robert Judet and Emile Letournel combined their findings during surgery with a radiological assessment of the fracture patterns to develop a classification system and propose some surgical approaches for these type injuries. The classification they formed with four elementary fractures patterns was applicable for 111 of the 173 cases. The remaining cases consisted of one of the elementary fractures patterns together with some additional fracture lines.[16] The four elementary fractures include: 1) fracture of the posterior lip; 2) fracture of the ilioischial column; 3) transverse fracture; 4) fracture of the iliopubic column.

For assessment of these fractures Judet developed an x-ray view, now known as the Judet view or obturator view.

Robert Judet (September 13, 1909 – December 20, 1980) was born in Paris as son of an orthopaedic surgeon.[17] He started working in general surgery but turned soon to orthopaedic surgery like his father and elder brother. During the war he was involved in the Resistance and even arrested by the Gestapo. He was fortunately released because of the lack of evidence of his clandestine activities. His exploit earned him, among other decorations, the medal Chevalier and Officier de la Légion de Honneur.[17,18] In 1953 he was nominated for the first orthopaedic teaching post in France. In 1956 he started as „chef de service" at the Hôpital Raymond-Poincaré in Garches. He held this position until his retirement.[18] Judet was appointed professor of orthopaedics and traumatology in 1963.[18] With his brother[19–22] and later on his son[23,24] he contributed to the development of total hip replacement. He was known for his energy and keen mind.

Émile Letournel (December 4, 1927 - August 16, 1994) was born on St Pierre et Miquelon, a French island group in the St. Lawrence river off the coast of Newfoundland (figure 3).[18] He obtained a scholarship at the French institute in London, which was temporarily moved to a location near Edinburgh because of the Second World War. After the war he went to France and applied for a position in orthopedic surgery in 1960. He applied for a position with Professor Judet. He had no letters of recommendation and the meeting with Judet was brief. At the meeting Judet asked him where he came from and Émile responded "St. Pierre et Miquelon". Judet checked his agenda and offered Émile a 6-month residency the following year. The 6-month position was extended for another 6 months and Emile subsequently became Judet"s assistant. Émile stayed with Robert Judet until his retirement in 1978.[18]

*Figure 3. Commemorative stamp from 1999 of Émile Letournel (1927 – 1994) (author's collection)*

His thesis in 1961 contained the initial description of the classification system of acetabular fracture, developed by Robert Judet and himself, and was internationally accepted because of its clinical usefulness.[25,26] Based on his own experience of over 1000 operated fractures of the acetabulum he developed a treatment algorithm for all the acetabular fracture types. His greatest pride and delight was to see the mastery of his techniques reproduced by his students. Professor Letournel never used a depth gauge. He would merely place his finger on the drill bit at the appropriate length of penetration to measure the correct length of the screw.[18] He

believed that the only way to treat an acetabular fracture optimally is by perfect reduction and he struggled with the fracture elements until he was satisfied with the result.[18,25,26]

*Clinical implication*

The Judet-Letournel classification remains an important tool for grading acetabular fractures and it helps in optimizing the surgical planning and treatment. Even the rise of computed tomography (CT) has not changed the usefulness of this classification system.[27] The introduction of the CT-scan has not changed the classification system of the fractures, but it does however replace the function of the traditional Judet views in some clinics.[28] There is a high interobserver reliability among surgeons treating acetabular fractures on a regular basis.[27] Although modification has been done to simplify the classification system, the foundation of acetabular classification according to the „4 elementary fractures with possible additional fracture lines" should be attributed to the pioneering work of Judet and Letournel about half a century ago.[29]

**Kocher-Langenbeck approach**

Approximately 150 years ago, the German physician Bernard von Langenbeck described his posterior approach of the hip joint to treat infections and war wounds around the hip. He described his approach as the „longitudinal incision", as he called it himself, in 1867.[30] He stated that he performed the approach as described by Wight and Velpeau before developing his own approach. He first tried it on cadavers and reported this approach after performing it twice in a living individual. During a Langenbeck approach, the patient is in lateral decubitus and the hip should be in a 45 degrees flexed position and the incision goes from the middle of the trochanter in the direction of the spina iliaca posterior superior. The joint is then reached by passing between the bundles of the gluteal muscles. His Swiss colleague Emile Kocher extended this approach caudally, thus becoming the Kocher-Langenbeck approach.[31]

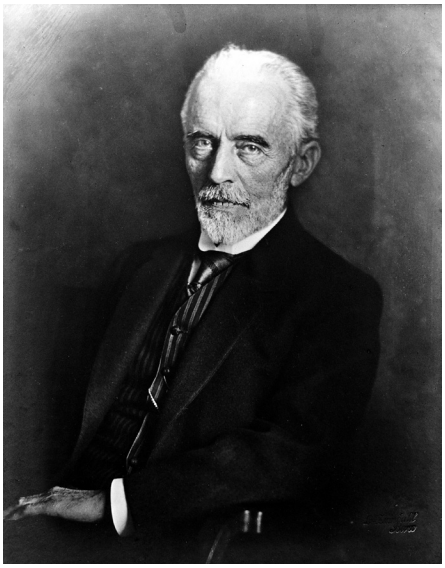

*Figure 4. Emil Theodor Kocher (1841 – 1917) Photograph by L. Zumbühl, Bern. Source: Wellcome Library; no. 13012i (CC-BY 4.0).*

Emil Theodor Kocher (August 25, 1841, to July 27, 1917) was born in Bern, Switzerland (figure 4). He graduated summa cum laude. After graduating from medical school he visited major surgical clinics in Europe, including those of Von Langenbeck and Billroth.[32,33] Afterwards he returned to Bern to become professor of surgery and director of the department of surgery at the university in 1872, a position he held until his death. Ironically he had applied for post-graduate surgical training in Berlin with Von Langenbeck but was denied admission because of his Swiss nationality.[34] He was invited to come to Prague as a professor, but he used this opportunity to negotiate the building of a new hospital in Bern by the government for his stay. Kocher devoted all of his time to his work and demanded the same dedication of his assistants. He once reassured an exhausted resident that „if one person dies from too much work, 999 die from doing nothing".[32,33] His hard work, especially on thyroidectomy, was awarded with the Nobel prize for physiology and medicine in 1909. He became the first surgeon to become a Nobel laureate.[32–35]

Bernhard Rudolf Conrad von Langenbeck (November 9, 1810- September 29, 1887) was born in Padingbüttel, Germany, as the son of a clergyman (figure 5). Instead of following in his father's footsteps he pursued a career in medicine. In 1830 he started studying in Göttingen.[36,37] With inspiration and help of his uncle he finished his dissertation 4 years later on the anatomy of the retina. His thesis earned him a two-year fellowship in Belgium, France and England. After returning to Göttingen in 1838 he became a lecturer of physiology and pathological anatomy. After this he became subsequently professor of surgery at the university of Kiel and Berlin. His popularity as a teacher became evident as students in Berlin arranged public demonstrations and signed petitions to get Von Langenbeck appointed.[37,38]

*Figure 5. Bernhard von Langenbeck (1810 – 1887) (Origin and author unknown. Public domain image)*

Von Langenbeck was known for his equal treatment of rich and poor patients. His unprejudiced approach became also evident during his appointment as army surgeon during the Schleswig-Holstein wars (1848-

1850 and 1864), the Austrian war (1866) and the Franco-Prussian war (1870-1871). He stated that „a wounded enemy is no longer an enemy but a comrade who needs help". His efforts during the Schleswig-Holstein wars earned him heritable nobility, which resulted in the adding of „Von" to his last name on July 9, 1864. In tragic contrast the war also made him lose his only son.[34,36–38]

His experience with war surgery resulted in a keen understanding of subperiosteal bone resection and concomitant regeneration. A fitting quote on this technique could be applied on surgery in general. He stated that the „the choice of method is less important than careful performance of the procedure".[34] Among his students were many future professors and important contributors to medical science, for instance Billroth, Hueter and Trendelenburg (all owners of their own eponym). Von Langenbeck retired at the age of 70 due to poor eyesight as a result of cataract. He died of a stroke in 1887 and had already furnished his tombstone with his motto „nusquam retrorsum" (never backwards).[34,36–38]

*Clinical implication*

Up to this day, posterior column or wall acetabular fractures are best approached through the Kocher-Langenbeck approach resulting in good exposure.[39–41] The anterior approaches have modifications reported, but not so for the posterior appoach.[39,42,43] The most common perioperative complication is a sciatic nerve injury.[40,41,44] Whether the patient is prone or in a lateral decubitus position during the approach does not lead to significant differences in fracture reduction and operative time, blood loss and complications.[45] In case of involvement of both the posterior and anterior column, the Kocher-Langenbeck can be combined with the anterior approach in a two-incision technique.[46]

**Stoppa approach**

The original approach, as described by René Stoppa approximately 50 years ago, was initially intended to treat inguinal hernias. The operation according to Stoppa comes with a „midline lower abdominal incision".[47] Subsequently, bilateral cleavage of the subperitoneal (pre-peritoneal) and suprapubic regions is accomplished. The margins of the dissection should reach the psoas muscle laterally, the umbilical region above, and behind the os pubis to the obturator foramen below. Stoppa used his approach to position a mesh in the between the peritoneum and the abdominal wall. Over time the Stoppa approach gradually became less used in hernia surgery, because it became possible to operate in Stoppa's pre-peritoneal space by endo-

scopic techniques. However, the advantages of the good exposure of pelvis during a Stoppa approach has not gone unnoticed by orthopedic and trauma surgeons. Over the past 20 years, the Stoppa approach has been increasingly used to treat acetabular and pelvic ring fractures.

René Stoppa (1921-2006) was born in a small fishing village of Constantinois in the northeastern part of Algeria (figure 6).[48] At a young age, he started studying medicine at the University of Algiers. During World War II, he was recruited for active duty in France's First Army. After the war, he continued his medical studies and became an assistant in the anatomy laboratory of the University of Algiers. He graduated as a medical doctor in 1954 and qualified for surgery that same year. He practiced as a surgeon in different hospitals in Algiers and in 1962 he became chief of the Surgical Service of the University of Algiers Surgical Center. A few years later, he was appointed surgeon-in-chief and professor of clinical studies at the University of Amiens in the northern part of France. Professor Stoppa was trained as a general surgeon. His primary field of interest was gastro-intestinal surgery and surgery of the abdominal wall. In hernia surgery, he initiated research projects about the use of prosthetic materials, the mechanism of hernia formation, and the classification of groin hernias. In 1965, he and his colleagues developed a technique – the so-called giant prosthetic reinforcement of the visceral sac - to treat recurrent groin hernias.[47,49] With this procedure, a large synthetic mesh was positioned between the peritoneum and the muscular layers of the abdominal wall through a midline pre-peritoneal approach (Stoppa approach). This approach had the potential advantage that damage to the spermatic cord, nerves and blood vessels of the abdominal wall was avoided. Ten years after they started using this technique, Stoppa and his colleagues reported satisfactory results in over a 100 patients with difficult hernias, who had been treated this way.[47] René Stoppa published over 500 articles during his career, and he organized or presided several national and international conferences.[48] He was a member of many distinguished national and international surgical societies. In 2005, the year before he died, he was awarded the distinction of honorary member of the French Surgical Association. Stoppa was described by his colleagues as: "a surgeon with a keen sense of curiosity, a largely open eye and mind, and a man who cultivated an interest in surgical innovations".[48]

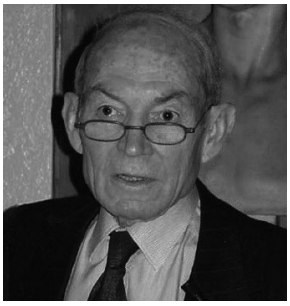

*Figure 6. René Stoppa (1921 – 2006) (Reprinted with permission from Springer from Hernia49, Jan 1 2007)*

*Clinical implication*

The Stoppa approach provides good exposure of the anterior column and the quadrilateral plate in case of acetabular and pelvic ring fractures. In contrast to the ilioinguinal approach, the Stoppa approach allows direct accessibility and visualization of the superior acetabular articular surface, the quadrilateral surface and any superior medial dome-impacted fragments. Therefore over the last decades, this approach has been increasingly used to treat these types of fractures and also for packing and hemorrhage control in patients with pelvic fracture bleeding.[42,50]

## Discussion

Probably without being aware of it, we use eponymous terms several times a week in medical conversations on the ward or in the operation room. It is no coincidence that we use these eponymous terms, because we have become familiar with them during our surgical training. Surgeons in the early days were traditionally trained in a master-apprentice relationship in which the trainee was employed for a number of years by a master surgeon.[51–54] The apprentice would learn about surgery and treat patients under the guidance of the master surgeon in a surgeon's shop. Like the art of surgery was traditionally transferred from the master surgeon to his pupil, so the eponyms have been transferred from one to the next generation of surgeons over decades. The eponymous terms honour someone's master surgeon and are part of the history of surgery. They commemorate the surgeons who contributed to the acquisition of knowledge of a particular condition.

This article provides an overview of the eponymous terms that have been associated with pelvic and acetabular fracture care. By retrieving the original papers and studying the literature dealing with these eponyms, we elucidated the lives and work of the physicians, whose names has been attached to these terms. By telling the stories of the persons behind the eponyms it will be easier to understand their meaning from a historical point of view. In one of our clinics, a level 1 trauma center in the Netherlands, 3 out of the 5 discussed eponymous terms associated with pelvic injuries are still used in our daily practice. The eponymous terms „Duverney and Malgaigne fractures" are no longer used. Both these fracture types were identified far before x-rays and pelvic classification systems were available. The imaging techniques and fracture classification systems of pelvic injuries have improved tremendously over the past few decades, which is probably one of the most important reasons that both eponymous terms have become less relevant. On the other hand, the eponymous terms Judet–Letournel classification, Kocher–Langenbeck and Stoppa approach are still being used on a regular basis. The basic

principles of the Judet–Letournel classification, which was introduced half a century ago, is the foundation of the current AO/OTA pelvic classification system. Furthermore, the operative approaches according to Kocher-Langenbeck and Stoppa have not changed over time. The meaning of these eponymous terms today corresponds to the original meaning based on the first descriptions.

There are pros and cons about whether we should use eponyms or not. First of all, we could ask ourselves whether the eponyms are reliable and used properly in case of medical information transmission. Recently it has been described that the current meaning of the majority of the eponymous terms used in upper extremity surgery differ from their original description.[55] It is important to be aware that the meaning of an eponymous term might gradually change over time, for instance due to the increase in knowledge about a specific injury or changing perceptions among physicians. Eponymous terms will be cited repeatedly in scientific literature over time, which might contribute to an altered meaning of an eponymous term as well. It is important to make sure that the definition of the eponymous term is clear when we talk, read, or write about an eponymous injury or a surgical technique.

## Conclusion

When an eponymous term is used it would therefore be appropriate to define its original meaning clearly and to make a reference to the original paper. After all, it is interesting to know about the background of our eponyms. They are part of our surgical heritage and might be considered a tribute to our predecessors and their pioneering work in surgery.

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# CHAPTER 12

## Eponymous hip joint approaches

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**Abstract**

After the low friction arthroplasty by John Charnley was no longer confined to specialized hospitals but commonplace in the general orthopedic practice, the issue remained how to most optimally reach the hip. The names of the authors of these approaches remain in a lot of cases connected to the approach. By evaluating the original articles in which the approaches are described we ascertain the original description and technique. By various sources we obtained the (short) biography of the people whose name is connected to the approach. Our research covers the biographies of colleagues Smith-Petersen, Watson-Jones, Hardinge, Charnley, Moore and Ludloff. The eponymous approaches are shown and described after the short biography on each individual. This study shows that without the work of our colleagues we cannot proceed in our profession.

An understanding and knowledge of the people who dedicated themselves to developing the orthopedic surgery to the high standard it has today is the least honour we should give them.

## Introduction

After the introduction of the first successful hip prosthesis, existing of a cemented hip implant and using a metal-head on a polyethylene cup articulation, by Charnley in 1962, the total hip replacement has become the most successful operation in medicine.[1] With over 285,000 hip replacements performed in a year in the United States, one could state that the approach to the hip is like the back of the hand of many orthopaedic hip surgeons.[2]

There probably is no ‘‘best approach’’ to the hip. The choice of which approach to use depends on the type of surgery and most important on the surgeon’s preference and expertise. When approaching the hip it is also important to consider whether it is conservative hip surgery or hip replacement surgery. It is also important what part needs to be accessed for the specific surgery such as the acetabulum, the femoral head, the anterior or posterior aspect of the joint (Fig. 1). Nevertheless, there are many roads that lead to ‘Rome’ (Table 1). During the development of hip surgery in general and hip replacement surgery in detail, various approaches were tried and developed. The surgeons that promoted one of these approaches often have their name connected to that specific approach. We discuss six of these approaches, and some of the modifications to the hip joint and the surgeons who developed or promoted them.

*Table 1. The discussed approaches at a glance*

| | | |
|---|---|---|
| Anterior approach | Smith-Petersen (1886-1953) | Superficially the internervous plane between the sartorius and tensor fascia latae muscle is used. Deeper the plane between the rectus femoris and iliopsoas is used. Nowadays, the internervous plane between the rectus femoris and gluteus minimus is commonly used (Hueter interval). |
| Anterolateral approach | Watson-Jones (1902-1972) | Uses the intermuscular plane between the tensor fascia lata and gluteus medius. |
| Lateral transtrochanteric approach | Charnley (1911-1982) | Uses a trochanteric osteotomy for acces to the hip joint and no internervous of muscular planes. |
| Straight lateral approach | Hardinge (1939 - ) | Bisection at the anterior half of the periosteum covering the greater trochanter is used. |
| Posterolateral approach | Moore (1899-1963); ‘Southern’ | Approach of the hip by bluntly dividing the gluteus maximus muscle. |
| Medial approach | Ludloff (1864-1945) | The interval between the adductor longus and magnus muscle is used through a longitudinal incision. Proximally the plane between the adductor and pectineus muscle is used. |

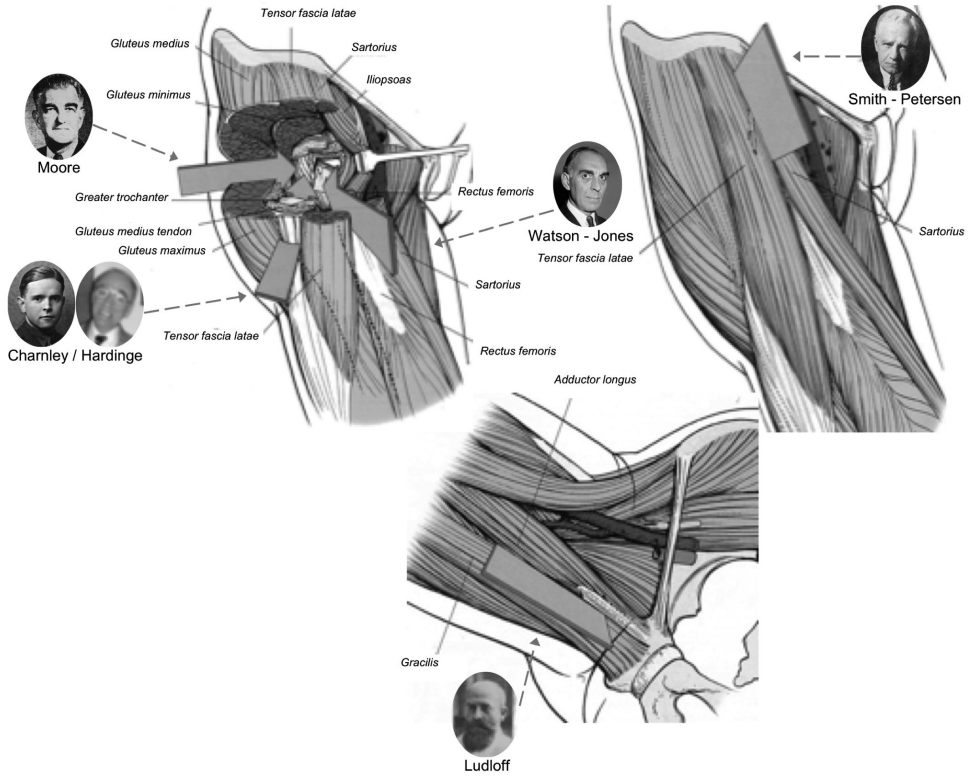


*Figure 1 Overview of eponyms discussed*[8]

**Anterior approach: Smith-Petersen**

Marius Nygaard Smith-Petersen (November 14, 1886–June 16, 1953) was born in Grimstad, Norway (Fig. 2). In 1903 he moved with his mother to the United States, without the ability of speaking English. This he picked up swiftly. After graduating from the University of Wisconsin (1910) and Harvard Medical School (1914), he started his general surgical internship at the Peter Bent Brigham Hospital in Boston under supervision of Doctor Harvey Cushing.[3] In 1917 he published his relatively bloodless supra-articular subperiosteal approach to the hip. He developed this approach after being disturbed by the shock the patients experienced following exsanguination after hip surgery in those days. At that time he was a resident orthopaedic surgeon at the Massachusetts General Hospital. In October 1922, he started a private practice after being a house officer.[4]

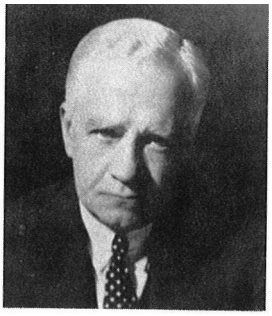

*Figure 2 MN Smith-Petersen, courtesy of the AAOS*

His contributions to orthopaedics are, amongst others, the approach to, arthrodesis of the sacro-iliac joint (1921), internal fixation of a fracture of the femoral neck (1931), mold arthroplasty of the hip (1939) and osteotomy of the spine (1945).[4] In search of a better method to relieve patients with pain in case of a deformed hip, without performing an arthrodesis, he investigated the use of glass, viscaloid, Pyrex® and Bakelite® before he developed his vitallium mold arthroplasty. As a surgeon, he was known to be slow and meticulous. Both with exposure and closure he followed the anatomical pattern as closely as possible.[4–7]

In 1943 he was the president of the American Academy of Orthopaedic Surgeons. In 1946 he was awarded an Honorary MD of Oslo. He was an elected honorary member of the Royal Society of Medicine, the Norwegian Surgical Society, the Italian Society of Orthopaedic Surgery and Traumatology, the Royal Medical Society of Edinburgh, the British Orthopaedic Association and the Canadian Orthopaedic Association.

His nature was sensitive and shy. Next to this, he was known for his humility and sincerity. His life philosophy, in his own words, was: 'Derive happiness from doing for others. This is a privilege we have at all times—no one can take it from us'.[7] He died after a short illness and left behind his wife, whom he married in 1917, his daughter and two sons.[3–5]

The anterior approach is performed in supine position and utilizes superficially the internervous plane between the sartorius and tensor fascia latae muscle. Deeper the plane between the rectus femoris and iliopsoas was used by Smith-Petersen. Nowadays, the internervous plane between the rectus femoris and gluteus minimus [the Hueter interval, named after Carl Hueter (1838–1882)] is more widely used.[6,8] The rationale for using the latter window is that the anatomical plane between the femoral nerve zone and the superior gluteal nerve zone is respected. The anterior aspect of the hip capsule can be bluntly exposed and capsulotomy is performed to allow for exposure of the hip joint. Limit of this approach is the access to the femur and the posterior acetabulum. The structure at risk is the lateral femoral cutaneous nerve.[9]

**Anterolateral approach: Watson-Jones**

Sir Reginald Watson-Jones (March 4, 1902–August 9, 1972) was born in Brighton, Sussex (Fig. 3). He was the son of Edward Jones and Alice Watson. He was raised in Liverpool, where he also studied medicine. His training in orthopaedic surgery was under Sir Robert Jones (to whom he was not related), in Liverpool and later in London. His family name being Jones gave difficulty distinguishing himself from other Jones' in Liverpool and maybe also his supervisor Robert Jones', that was why he adapted his mother's maiden name in the early 1930s.[10] After finishing his training in 1926 his dedication led to a successful private practice, which was very important since hospital work in these days was unpaid. During the Second World War he became a key figure in military surgery. He specialized in the treatment of fractures. He was appointed early in the war as Civilian Consultant in Orthopaedic surgery to the Royal Air Force (RAF). He developed a systemic rehabilitation method starting very early after surgery, within a few days. After recovering from surgery, the soldiers were sent to specialised centres to undertake rehabilitation by exercise. This resulted in a return of personnel to full combat duty of 77 %.[3,11] He was involved in persuading investors in purchasing Headley

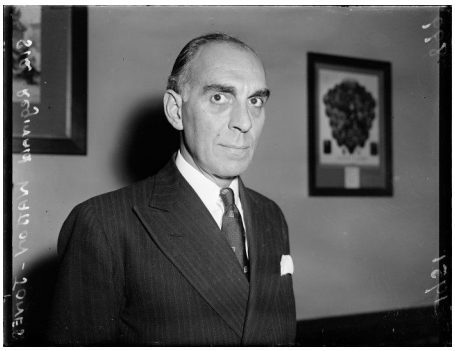

*Figure 3 Sir R Watson-Jones, 15th of June 1951*

Court in Surrey, which is until today a rehabilitation centre for ex-servicemen. He believed that the treatment of lower limb fractures should consist of prolonged immobilisation. This was accomplished with application of non-weightbearing casts. His unique plaster sessions, meant for training residents, were well-known. After the War, he found out that servicemen who had been imprisoned during the War by the Germans had, in case of femoral or tibial fractures, been treated by intramedullary nailing by Kuntscher and his associates.[12] At first he was convinced, Kuntscher had to be tried for war crimes, since the intramedullary technique had not yet been developed in the allied countries and was seen by him as maltreatment. He finally did not pursue this prosecution because the patients showed good results of the treatment. He was awarded the Hunterian Professor in 1945, the same year he was knighted for his services to orthopaedic surgery and his work for the RAF. He founded the British section of the Journal of Bone and Joint Surgery, which he edited from 1948 onwards until his death in 1972.[11] A regular day started at 06:30 a.m. with three or four private operations, followed by a full private outpatient clinic. In the afternoon he was performing hospital clinics or more surgery. All was

concluded with a dinner party and bridge. His legacy is in his book ''Fractures and Joint Injuries'', first published in 1940 and has seen about 15 reprints and many translations.[13] He was married to Muriel Cook who died in 1970, with whom he had a son and a daughter. In 1971 he remarried to Wallace Robertson.[3,10,11]

The anterolateral approach, in either supine or in lateral decubitus position, utilizes the intermuscular plane between the tensor fascia lata and gluteus medius. By elevating the gluteal muscles the hip capsule is exposed.[13,14] The structure at risk is the gluteus muscle that can get damaged during manipulation of reamers or impactors for the femur. Visualisation of the posterior acetabulum is limited.[9]

**Lateral trans-trochanteric approach: Charnley**

Sir John Charnley (August 29, 1911–August 5, 1982) was born in Bury, Lancaster, England (Fig. 4) He studied medicine at the University of Manchester, winning scholarships and prizes. He received his medical degree in 1935 and was admitted to the Fellowship of the Royal College of Surgeons in 1936. As a member of the Royal Army Medical Corps from 1939 to 1945 he served in Dunkirk and ran an orthopaedic hospital in Cairo.[15–17] After the war, he completed his training in orthopaedics in Oswestry.

*Figure 4 Sir J Charnley, 1940, serving in the RAMC, courtesy of the John Charnley Trust.*

Next he worked in Wrightington Hospital from 1950 onwards. Nowadays the Wrightington Hospital still remains a center of excellence for orthopaedic surgery.[3] He had an inquisitive nature and made several inventions. This nature is perhaps most clearly shown by the fact that, to elucidate the function of the periosteum, Charnley convinced a junior colleague to operate on him by placing a piece of cancellous bone from the tibia from underneath to above the periosteum. Unfortunately, this resulted in an osteomyelitis that required several surgeries.[16] His most well known contribution to orthopaedic surgery is the total hip arthroplasty, which he insisted in referring to as a low friction

arthroplasty, emphasizing the need to get a friction coefficient in the artificial joint close to the normal joint.[2,18,19] Interestingly, his preceding research was in the field of arthrodesis, resulting in the publication of 'Compression Arthrodesis' in 1953. After this work on abolishing movement, he dedicated himself to finding a way of restoring it in the painful joint. The result was the Charnley hip replacement in 1962. His first statement in 1964 on survival of hip implants with bone cement, based on the survival in a retrieval study in patients with an arthroplasty who had died, was three and a quarter years.[20] This meant, it was only indicated in the elderly patient. Today we know a follow-up of 40 years of the more or less the same Charnley arthroplasty.[18]

A problem next to fixation was infection. Therefore he developed the clean air enclosure in collaboration with Doctor Hugh Howorth. John Charnley for many years did not give prophylactic antibiotics because he thought that the clean air enclosure was sufficient to produce a sterile environment. Another notable work of Charnley is the book 'The Closed Treatment of Common Fractures', which at present remains feasible and useful in treating trauma conservatively.[3,15,16] He was awarded the Lister Medal in 1975 for his contribution to surgical science and knighted by Queen Elizabeth II in 1977 for his work on the development of the low friction arthroplasty. Although having been a confirmed bachelor, he met Jill Heaver in 1957 and married her 3 months later. They had a daughter and a son together.[15,17–20]

The lateral transtrochanteric approach, in either supine or lateral decubitus position, goes straight to the greater trochanter after opening the fascia lata. To obtain exposure to the hip a trochanteric osteotomy with a Gigli saw (named after Leonardo Gigli) is performed. This is also the weakness of the approach. A common problem is nonunion of the osteotomy or the breaking of the wires used to re-attach the greater trochanter leading to migration. This results in lesser abductor strength. Also a restricted weight bearing for 6 weeks is a disadvantage. The advantage is that the gluteus medius muscle is not damaged, preventing a positive Trendelenburg after the osteotomy heals.[19]

**Straight lateral approach: Hardinge**

Kevin Hardinge (July 11, 1939–) was born in Douglas, Isle of Man (Fig. 5) After attending the Douglas High school for boys, he started studying medicine at the Liverpool University in 1957. In 1969, he obtained his qualification as an orthopaedic surgeon. In 1971 he was made a Hunterian Professor by the Royal College of Surgeons. After a short period as a consultant orthopaedic surgery at the Manchester Royal Infirmary he started working in the Centre for

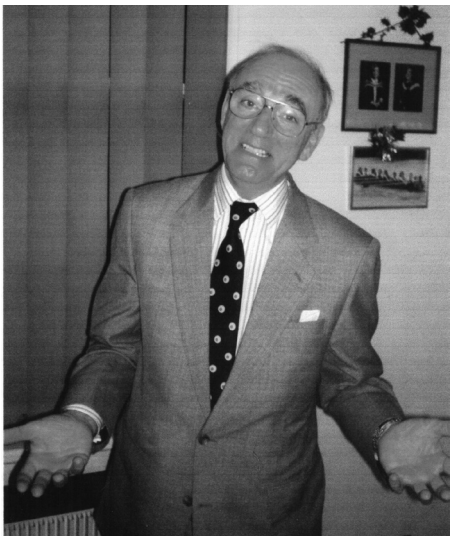

*Figure 5 K Hardinge, author's collection*

Hip Surgery at Wrightington Hospital in 1976. Here he worked with John Charnley during the last years of Charnley's life. These days the approach to the hip was straight lateral with the use of a trochanteric osteotomy. Frequently this resulted in postoperative wire breakage (used for trochanteric fixation) and accompanying trochanteric migration. Although Charnley thought a total hip replacement without a trochanteric osteotomy was anti- Christ, Hardinge started performing the approach without an osteotomy. Convinced the result would not be comparable, Charnley went to the ward to ask how Hardinge's patients were doing. The straightforward answer of the nurses was that 'Hardinge's cases do as well as anybody elses', made him come round. After retiring from clinical practice in 2004, Hardinge is still an honorary lecturer in orthopaedics for the Victoria University of Manchester. Also, he remains active in performing and coordinating clinical research at the Wrightington hospital. Hardinge is married and has two children.[21]

The straight lateral approach, in either supine or lateral decubitus position, uses bisection at the anterior half of the periosteum covering the greater trochanter, thus preservering the tendinous insertion of the gluteus medius and minimus proximally and vastus lateralis distally.[22] Structures at risk during anterior retractor placement include the femoral nerve, artery, and vein. The lateral femoral circumflex artery may also be injured during vastus lateralis mobilization. The advantage is the possibility for extensile exposure of the femur.[9]

**Posterior or posterolateral approach: Southern, Moore**

Austin Talley Moore (June 21, 1899–1963) was born in Ridgeway, South Carolina (Fig. 6). After graduation in 1920 he started to study medicine at the Medical College of South Carolina, completing his studies in 1924. In 1927, after his internships in Columbia, South Carolina and Pennsylvania, he started practising orthopaedic surgery in Columbia. He founded the Moore Clinic in Columbia in 1939.[3,23] The prosthesis he developed was made of vitallium, an alloy of cobalt, chromium and molybdenum.

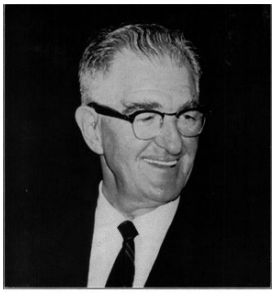

*Figure 6 Austin Moore, author's collection*

He wrote the first known case of a metal hip implant in 1942, which was more of a proximal femur replacement because of a giant cell tumour.[24] In June 1963 he received an honorary doctorate degree of the Wofford College at Spartansburg, South Carolina, were he graduated 43 years earlier. Dr. Moore travelled the world lecturing about his experience as a pioneer in the field of the femoral-head prosthesis. He died suddenly in 1963, still being an active and distinguished surgeon. He left behind his wife and their only son.[3,23,24]

The origins of the name 'southern approach' is not fully elucidated but the most probable explanation is that the first report on Moore's approach was published in the Southern Medical Journal in 1952 or that it originated from South Carolina.[25]

The posterolateral approach in lateral decubitus position is performed by bluntly dividing the gluteus maximus. This allows for adequate visibility of the posterior aspect of the hip area. The exact handling of the piriformis, gemelli, and obturator externus tendons is not stated. Probably they were taken from their insertion when opening the capsule longitudinally.[25,26] Excellent visibility of both the acetabulum and the femur is obtained with this approach and this approach has been widely used for both primary and revision hip arthroplasty. The sciatic nerve is at risk for (traction) damage and needs to be protected carefully throughout the operation. Due to the possibility that blood supply of the circumflex artery may get damaged, resulting in avascular necrosis, has limited its use in conservative hip surgery.[9,27]

**Medial approach: Ludloff**

Karl Rudolf Ludloff (June 7, 1864–1945) was born in Gundersleben, Germany (Fig. 7) After studying in Jena, Wu¨rzburg, Munich and Strassbourg, he received his doctorate in Jena in 1894. He started working at the physiology department in Ko¨nigsberg afterwards and in 1896 he turned to surgery. In 1901 he changed again, this time finally, to become an orthopaedic surgeon. One year later he moved to the university clinic of Breslau, in nowadays Poland, becoming a titular Professor in 1906 and ordinary honorary Professor in 1913.[28,29] He was invited to come to both Frankfurt and Berlin in 1914. The prospect of being able to start a new clinic in Frankfurt decided his course and he left Breslau to become the director of the University Clinic of Orthopaedic Surgery in Frankfurt in October 1914. He held the presidency of the German Orthopaedic

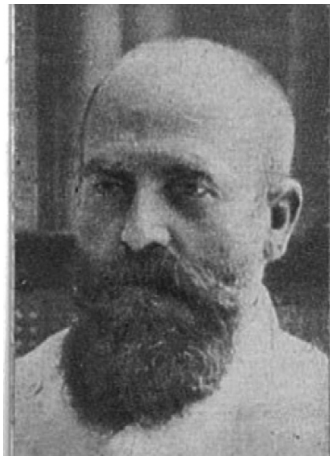

*Figure 6 K Ludloff, author's collection*

Society from 1914 until January 1919. In 1916 his work on nerve reconstruction was presented at the convention of the German Orthopaedic Society, which was reported in the New York Times. In his book on ''Congenital dislocation of the hip'', published in 1902, he described 23 cases of which only one was treated with an open reduction. Six years later he described the open method of hip reduction from which the approach would come to bear his name. He died in 1945.[28–31]

The medial approach utilizes the interval between the adductor longus and magnus muscle through a longitudinal incision. Proximally the plane between the adductor and pectineus muscle is used.[31] Patients are positioned supine with the affected hip flexed, externally rotated and abducted. This approach provides excellent exposure for a psoas release and congenital hip dislocation. The preferred age of infants for this approach is between seven and 18 months. The approach is not used to place a THA but has its purposes in reaching the hip joint, especially in infants with congenital hip dislocation or septic arthritis.[32]

**Discussion**

An essential part of hip surgery is the exposure. Smith-Petersen learned in his days that the approach, when ill performed, might lead to exsanguination of the patient. This led him to develop a new approach. This was a revolutionary decision because it enabled a safer way for the patient to reach the hip joint.

Nowadays the Smith-Petersen anterior approach has been used sporadically for total hip arthroplasty, but is popularized in the last decade as previous concepts of ''big surgeons make big incisions'' does not hold true in modern day practice. Since the first hip arthroplasty, there is more and more a demand for minimally invasive approaches (limiting muscle damage and not per se incision length) to the hip such as the direct anterior approach, also referred to as Anterior Minimally Invasive Surgery (AMIS approach) or Anterior Supine Intermuscular (ASI) approach.[33]

These techniques are based on the classical Smith-Petersen approach with the Hueter modification, but use smaller incisions (7–10 cm) than the conventional approaches in combination with the need for specialized instruments or operation tables. The key limitation of the anterior approach is the limited access making it technically demanding to place components in arthroplasty. The anterior approach allows adequate access to the acetabulum, but the access to the proximal femur is limited.

The outcomes of these minimally invasive procedures vary. Many authors claim that this approach would result in less muscle damage and rapid recovery, although only limited data exist to support these claims.[34–36] Nevertheless, any attempt to decrease pain, blood loss and recovery time may be a benefit for the patient, which would enable a quick return to daily routine.

The direct anterior approach may be comparable to other THA approaches, but the direct anterior approach is a difficult technique with a clear learning curve. During the learning curve a higher rate of complications may be encountered.[36–38] In general, operation time is longer and the use of angulated reamers for the acetabulum, offset broaches for the femur, specialized retractors and mobile traction tables are used for help with prosthesis placement. In some studies also the use of navigation or intra-operative X-rays are used for perioperative control.[33,39] Complications unique to this approach (fractures and nerve damage) have been well described.[27] The incidence of these complications will decrease with greater surgeon experience.
Also other minimally invasive procedures (incision size smaller than 10 cm) have been suggested for the posterior, lateral and anterolateral approaches.[34,40] The assumptions, but also the controversies, with regard to outcome of these procedures are similar in all minimally invasive procedures. In meta-analysis no significant benefits (focused on blood loss, recovery and analgesia consumption) of these minimally invasive techniques were proven.[40–43] The outcomes of minimally invasive surgery can be excellent but are not necessarily superior to the standard techniques. New and improved anesthesia techniques, as well as pain management medications and methods, have reduced pain and improved early recovery after hip replacement surgery. These factors also play an important role in early recovery, regardless of the approach. In current practice, any method of speeding up recovery after surgery is desirable as most people nowadays are anxious to return to their day-to-day activities.[44,45]

The aforementioned is important since it shows that in a mere 75 years of development and research, we went from an operation that almost lead to death of a patient to, a procedure that more and more focuses on quick rehabilitation and has a high technical demand in posi-

tioning of the components instead of the type of approach used. Whereas the first reported series consisted of only several patients undergoing an approach and having a hip prosthesis implanted, we nowadays demand reports on larger groups with their results in the long term before initializing the use of a specific approach.

To remember where we came from while perfectioning the modern techniques and implants we think it is invaluable to be aware of the pioneers in hip surgery and the circumstances in which they performed their research and developed their approaches.

**Acknowledgments**

We would like to thank Dr. Hardinge for giving valuable information on both himself and on Sir John Charnley. Without the help of Piet deBoer we would never been able to get a clear and anatomically correct overview of all the different approaches. Also the help of Rebecca Nieuwe Weme in the processing of the figures is deeply appreciated.

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# CHAPTER 13

## Biographical background and origin of common eponymous terms in orthopaedic surgery: Anatomy and fractures in knee surgery

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**Abstract**

An eponym is a person after whom an eponymous term is named. These eponymous terms are easy shorthand in communication between surgeons. Therefore, they are often used and hard to eradicate. We discuss eponymous terms that describe anatomical features and fracture types in the knee. With these terms, an overview of the historical background of the eponym and its current clinical implication is discussed. The eponymous terms discussed are Gerdy tubercle, Pellegrini–Stieda lesion, Segond fracture, Hoffa fracture and fat pad. The meaning of the eponymous term is clarified, the biography of the namegiver given and its contemporary clinical implication discussed. Since eponymous terms are used frequently in inter-collegial discussion and literature, the meaning should be clear for everyone, since otherwise it might give room for misunderstanding.

Keywords: Eponyms - Gerdy - Pellegrini–Stieda -Segond - Hoffa

## Introduction

An eponym is the person after whom an eponymous term is named. In medicine, there are over 20,000 eponymous terms, and orthopedic surgery is not free of them either[2,12]. By using these eponymous terms in the correct manner, we all know what certain conditions, anatomical structures or types of fractures are meant. Besides the facilitation of clear communication, it gives a great insight into the early developments of our profession. When radiology was only 3 years old, Stieda described the lesion that was to bear his name later. Gerdy did not have this technique to help him and used his observation on anatomical dissection when describing his tubercle. The pioneers in orthopedic surgery remain visible in the anatomical landmarks and fracture types they have their name attached to. In this study of common eponymous terms in knee surgery, we will discuss anatomy and fractures (Fig. 1).

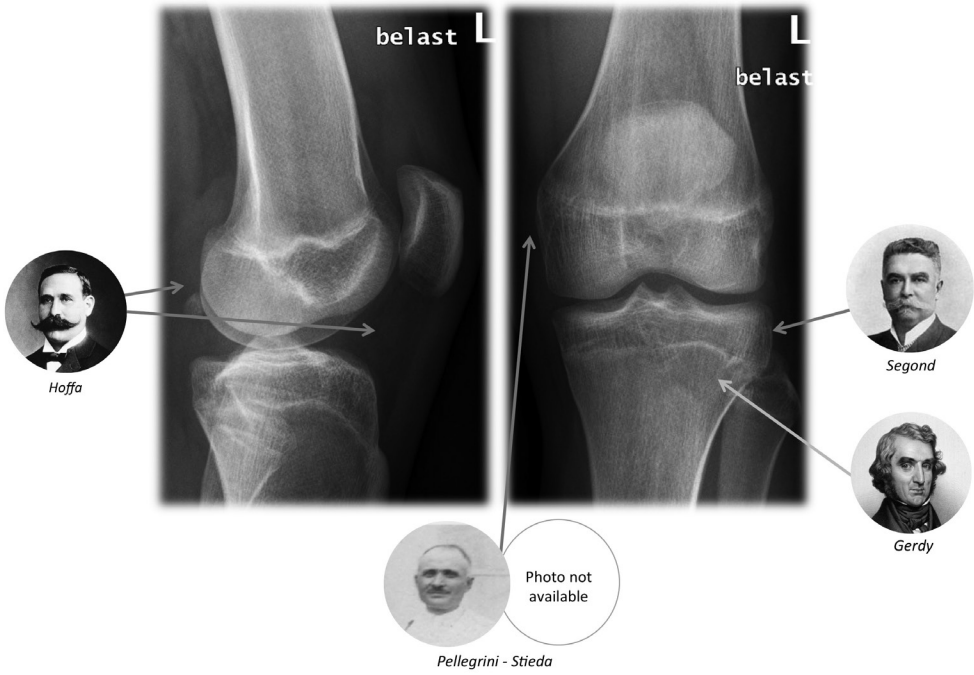


*Figure 1: overview of eponyms discussed*

**Gerdy tubercle**

Gerdy tubercle is the prominence on the lateral side of the proximal tibia where the iliotibial band (ITB) attaches, as do fibers of the tibialis anterior muscle[13].

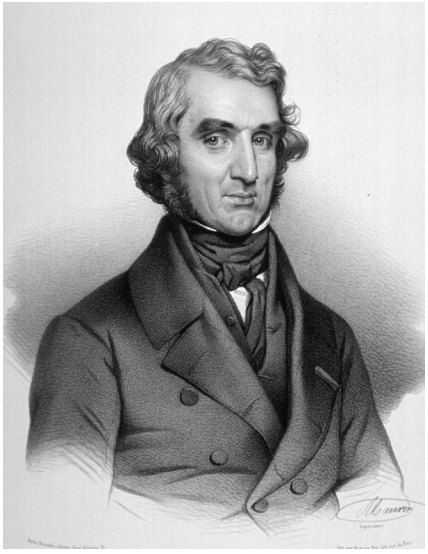

*Figure 2: Pierre Nicolas Gerdy (Wikimedia commons)*

Pierre Nicolas Gerdy (May 1, 1797–March 18, 1856) was raised in Loches-sur-Ource in France (Fig. 2). He was the son of a peasant who worked in the vineyards of northern France. He studied medicine in Paris[4]. Because he never had good results in his examinations, his clinical opportunities were limited. Thus, he focused on anatomy and physiology. As a teacher of anatomy, Gerdy excelled and gained notoriety and was offered a position within the Department of Medicine. His breakthrough was a publication that demonstrated that arteries and veins had intrinsic regulatory function, where before they were thought to be inert conduits of blood. This publication allowed him to pursue a surgical career[4].

He became a professor with the Faculty of Medicine in Paris and worked with renowned surgeons such as Jacques Lisfranc de St. Martin (1790–1847), Armand Velpeau (1795–1867) and Guillaume Dupuytren (1777–1835). The famed anatomist Paul Broca (1824–1880) was an assistant to Gerdy for a few years during the 1840s.

Gerdy suffered from tuberculosis his entire career[4]. Despite this limitation, he made numerous contributions to the medical literature on a wide array of topics. He wrote about the physiological characteristics of nerve sensation, gait analysis, abscesses, hernias, wound care, arsenic poisoning and of course anatomy. In addition, he worked with artists and sculptors, and in 1829 published Anatomie des formes extérieures du corps humain, appliqué à la peinture, la sculpture et à la chirurgie, a book of anatomy as it applied to sculpture, painting and surgery[4].

*Clinical implication of Gerdy's tubercle*

Since the tubercle is easily identified on the proximal anterolateral side of the tibia, it is an important anatomical landmark for, for instance, knee pain after total knee arthroplasty[7,22], lat-

eral release in total knee arthroplasty in valgus knees[36], location for avulsion fracture[33,37] and approaches for tibial fractures[21]. Furthermore, it is an important landmark in the recent interest of the anterolateral ligament of the knee, and the deep ITB, and its consequent need, although still under debate, to reconstruct them in anterior cruciate ligament (ACL) repair[8,23,24,33]. Finally, the tubercle is a good locator for a useful source for bone graft harvesting[5].

**Pellegrini–Stieda lesion**

Stieda discovered the ossification on conventional radiography and reasoned that it either originated from the medial collateral ligament (MCL) or the insertion of the medial head of the gastrocnemius muscle. He found in a cadaver study that the ossification was situated in the proximal part of the medial condyle of the distal femur and concluded that the lesion arose after direct or indirect trauma at the insertion site of the medial head of the gastrocnemius muscle[40].

*Figure 3: Augusto Pellegrini (with permission of the Pellegrini Family and Archive of Morcelli-Repossi Foundation in Chiari-Brescia (Italy))*

Pellegrini, in contrast, described the lesion as originating from another structure. The image in the article by Pellegrini shows a significantly larger and more distally located ossification compared to those in the manuscript by Stieda. Pellegrini upon surgical removal found the ossification to be located in the MCL[32].

A true Pellegrini–Stieda lesion would be an ossified medial gastrocnemius insertion in combination with an ossified MCL. It is probably most often used when dealing with a MCL ossification, so 'Pellegrini lesion' would perhaps be the most fitting eponym[1,9,16].

Augusto Pellegrini (June 26, 1877–1958) was born in Fucecchio, Italy (Fig. 3). He

was born in a wealthy family. After his medicine studies in Florence, he was appointed assistant in the general surgery department of the Florence Hospital, and he became professor of operative medicine in 1910[34]. In 1913, he became director of the hospital 'Mellino Mellini' in Chiari, near Brescia, Italy. There he continued his career for four decades. His most known work is on prosthetic limbs, in which he was a pioneer[34].

In 1904, he introduced disinfection of the hands solely with alcohol before each surgical operation, encouraging the healing of wounds by first intention[34].

Eugen Julius Karl Paul Alfred Stieda (December 11, 1869–April 30, 1945) was born in Dorpat, Germany, nowadays Estonia. Alfred Stieda was the son of the anatomist Christian Hermann Ludwig Stieda (1837–1918) and the brother of the surgeon Alexander Stieda (1875–1966)[17]. He attended the universities of Tübingen, Königsberg and Geneva, and he obtained his doctorate at Königsberg in 1891. Stieda worked at the medical clinic in Rostock, at the women's clinic in Giessen and at the surgical clinic in Königsberg[17]. In 1905, he started working at the department of surgery at Königsberg, becoming titular professor 1907. He subsequently worked in Königsberg as head physician at the surgical department of the Red Cross Hospital Bertaheim[17]. He committed suicide in 1945 while on the run for the soviet army.

*Clinical implication of the Pellegrini–Stieda lesion*

Important to note is that the Pellegrini–Stieda lesion is not the same as the Pellegrini–Stieda syndrome. If a there is a painful restricted range of movement in coexistence with the lesion, it is called the Pellegrini–Stieda syndrome. The initial treatment is rest–ice–compression–elevation. But if painful restriction of movement persists after local infiltration, surgical treatment could be indicated [16,41]. Since the ossification of the MCL or gastrocnemius rupture is a late sign, the Pellegrini–Stieda lesion in knees without symptoms should be seen as a 'scar' of passed injury and attention should be given to the patency of the MCL.

**Segond fracture**

An avulsion fracture of the proximal tibia on the anterolateral side is a Segond fracture. Segond described a high rate of hemarthrosis with these fracture although they are extra-articular. There was no direct association described with intra-articular lesions in the original publication, he reasoned the blood could have come from outside the joint through the capsule[35].

*Figure 4: Paul Ferdinand Segond (wikimedia commons)*

Paul Ferdinand Segond (May 8, 1851–October 27, 1912) was born in Paris (Fig. 4). He was the son of an anatomist. He studied medicine in Paris, and in 1875 he became an intern followed in 1878 by the function of prosector at the medicine faculty in Paris. He qualified as doctor in 1880 with a thesis on prostate abscesses and periprosthetic phlegmon[17,29].

He became an associate professor of surgery in 1883 and was made chef de clinique at Pitié-Salpêtrière Hospital later in the same year. In 1905, he succeeded Paul Jules Tillaux in the chair of surgery at the medicine faculty in Paris, a position that he held until his death. In 1909, he was elected as a member of the French Académie Nationale de Médicine[17].

In the early part of his career, Segond's contributions concerned the urinary system. Subsequently, he turned his attention to gynecological surgery and was influenced by the work of Jules-Émile Péan. Treatment of uterine or periuterine infection by vaginal hysterectomy became known as the Péan–Segond operation. He is known as the founder of obstetrics[17,29].

*Clinical implication of the Segond fracture*

A Segond fracture is often thought to be pathognomonic for an ACL injury. Although there is an ACL injury in 75–100% of the Segond fractures, the Segond fracture itself is only present in 3–7% of all ACL ruptures[44,46]. The Segond fracture should alert the physician diagnosing this entity that there is a high probability of other soft tissue injury, whether being ACL rupture, posterolateral corner injury, MCL rupture or meniscal injury[27,46].

**Hoffa fracture and Hoffa fat pad**

A Hoffa fracture is a frontal (most often lateral but sometimes medial) unicondylar fracture of the distal femur[14,26]. Bicondylar fractures are reported in the literature, but not in the original manuscript by Hoffa[6,11].

The Hoffa fat pad is situated as a wedge between patella, femur and tibia in the sagittal plane. It consists of fibrous fat tissue with a coating of synovial tissue. The upper part adheres to the ligamentum patellae, and the lower part is separated from the ligament by a bursa and is connected to the periosteum of the anterior part of the tibia[15].

*Figure 5: Albert Hoffa (wikimedia commons)*

Albert Hoffa (March 31, 1859–December 31, 1907) was born in Richmond, South Africa (Fig. 5). He was the son of the first German doctor in South Africa, Moritz Hoffa. The family originated from Kassel, Germany[28,31].

He studied medicine at the Universities of Marburg and Freiburg and became doctor in 1883. In 1887, he opened a private clinic for orthopedics, physiotherapy and massage in Würzburg, where in 1895 he became an associate professor at the university. In 1902, he succeeded Julius Wolff (1836–1902) at the department of orthopedics in Berlin[28]. In 1892, he founded the journal 'Zeitschrift fur

Orthopädische Chirurgie' and remained publisher until his death. He was one of the founders of the German Society for Orthopedic Surgery in 1901. That same year he was the first to perform an open reduction in congenital hip dislocation[31]. He was involved in the founding of different specialized institutions for specific types of care. Among these institutions was the Hohenlychen Sanatorium. He died in Cologne due to a heart attack on his way back home from a visit in Amsterdam. He left a wife and five daughters[28,31,42,47].

*Clinical implication of the Hoffa fracture and the Hoffa fat pad*

The Hoffa fracture is rare but can occur with low- and high-energy trauma, with or without accompanying fracture of the femur[6,19,26,43]. Iatrogenic Hoffa fractures can occur due to oversizing or malposition of an ACL femoral tunnel[45]. Anatomical reduction is mandatory since the fracture is fully intra-articular. Although rare, nonunion has been described and can and should be treated operatively even after a longer period of existence[20, 30, 38, 39]. As long as bone is connected to the cartilage of the condylar fracture, it can heal and the cartilage possibly gets nourished by the synovial fluid even though not connected to the rest of the femur[39].

The Hoffa fat pad has a soft consistency and moves considerably throughout the arc of flexion. It is a deformable to allow the expansion of the synovial compartment, and this facilitates the distribution of the joint fluid[25]. Being highly innervated and with a tendency to form scar tissue,

the fat pad is a common source of problems after injury or surgery. In patients with patella alta, superolateral fat pad impingement is common. The so-called Hoffa syndrome is a cause of anterior knee pain. It most often occurs in females and is easily mistaken for patellofemoral pain or instability[10,18,25]. Other disorders like patellar lateral femoral friction syndrome, impingement of the infrapatellar plica and arthrofibrosis or 'cyclops syndrome' can also give similar complaints[3,25]. Initial treatment is rest–ice–compression– elevation and quadriceps strengthening training. In chronic cases or failed conservative therapy, arthroscopic resection of the Hoffa fat pad is indicated[10], but this has extremely unpredictable results and can make matters much worse.

## Conclusion

Eponymous terms are a common way of communication in medicine. They provide a fast way of information transfer when used correctly. The origin of eponymous terms tells us a lot about the colleagues who were pioneers in medicine. By giving background information on the namegivers of the discussed eponyms, the history of our profession gets more color and the eponymous term itself can be perhaps more easily remembered.

Care should be taken though that the eponymous terms are used in a correct manner. As time passes, original publications might be forgotten and the original meaning changed or adapted to the modern days. To prevent miscommunication from happening, knowledge of the key publication and the information mentioned in those manuscripts needs to be remembered and repeated; otherwise, different interpretation of the eponymous terms can occur.

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# CHAPTER 14

## Ankle fracture eponyms

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## Introduction

The acute ankle fracture has often been cited as one of the most commonly treated musculoskeletal injuries. As such, considerable research has been conducted, along with many clinical studies, aiming to evaluate conservative versus surgical management, as well as radiographic classifications and long-term outcomes. Several types of ankle fractures are known historically by their eponyms. Eponyms are frequently used in orthopaedic surgery to denominate fractures, fracture-dislocations, and classifications, which are most commonly named after the physicians who first described them.

In 2007, a debate entitled ‘‘Should Eponyms Be Abandoned?’’ evoked strong responses both in favor and against the use of medical eponyms, and added interesting insights into their current use.[1,2] The opponents of the use of eponyms in the medical literature recommend abandoning them because they ‘‘lack accuracy, lead to confusion, and hamper scientific discussion in a globalized world.’’[1] Some disadvantages are obvious.

Some eponyms do not refer to the correct person but to a later researcher who made the same discovery. For example John Langdon Down did not discover the syndrome ‘‘mongolism,’’ but rather coined the term, which was later changed to Down syndrome because the former name was considered racist. Additionally, the person behind a medical eponym might have been involved in crimes against humanity, as was the case with Hans Conrad Julius Reiter in Nazi Germany. Other disadvantages are subtle. For example, pronunciation and spelling may be incorrect.

Foreign eponyms that have diacritics (e.g., acute or grave accents) are often misspelled or mispronounced. Sometimes it is hard to establish the exact spelling when you hear someone using an eponym. Finally, an eponymous fracture or classification system is only clinically relevant when it has consequences for treatment or when it influences prognosis. This has resulted in abandoning the scientific use of many of eponyms.

In contrast to these opinions, proponents advocate retention of eponyms because they are ‘‘often practical and a form of medical shorthand,’’ and ‘‘bring color to medicine and they embed medical traditions and culture in our history.’’[2]

Appropriate and uniform use of nomenclature regarding an ankle fracture, for example, is vital for the care of patients who sustain one since it is used for identification, classification, and

retrieval of information from databases and therefore often used by health-care providers when discussing treatment.[3,4]

The aim of this uniformity is to provide a flexible, practical, and scientifically acceptable term to describe a fracture and ensure clarity when discussing it. This promotes communication among colleagues, facilitates consistency in spelling, and avoids confusion in both the basic and clinical sciences.[5]

The objective of this article is to summarize and describe the most commonly used ankle fracture eponyms (Fig. 1). The first goal is to give some information about the people whose names are connected with these fractures, and the second goal is to provide a clear definition of the various ankle fractures. Because the history behind the eponym often remains obscure or unknown to the user, it is hoped that this report will serve as a resource and will aid in the preservation of orthopaedic history and prevent confusion when these eponyms are used.

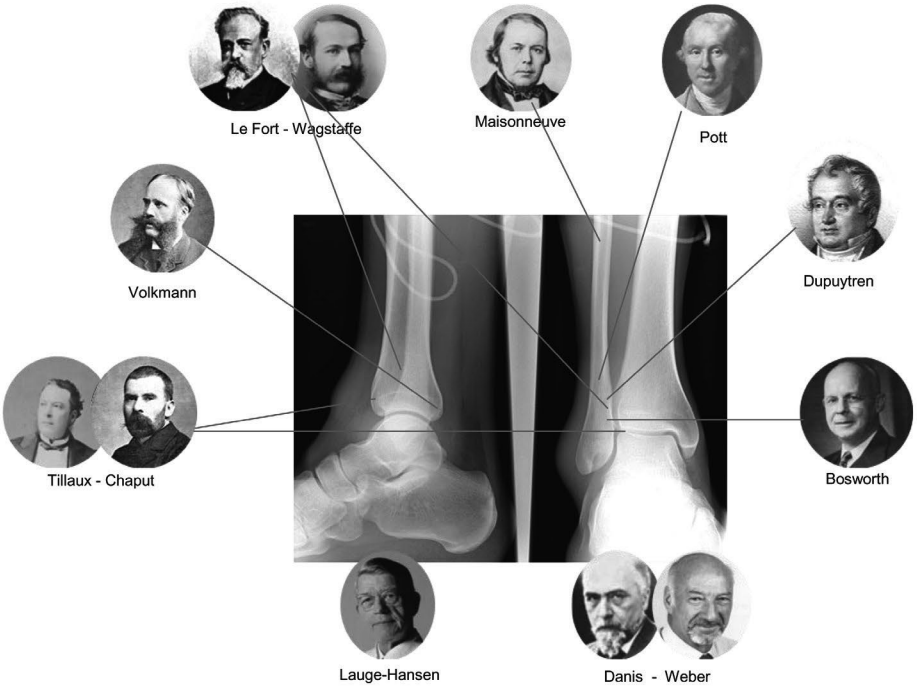


*Figure 1: overview of eponyms discussed*

**Pott Fracture**

Percivall Pott (Fig. 2) was born on January 6, 1714 in London on the present site of the Bank of England. Although educated to become a clergyman, he was apprenticed to become a surgeon at St. Bartholomew's Hospital in 1729, and he became an assistant surgeon in 1745. In 1749, he became a full surgeon, and he remained in this position until his retirement in 1787. In his own words, he ''served the institution as a boy and a man.''[6] In 1756, he was thrown off of his horse while riding to the Lock Hospital. He sustained a compound fracture of the ankle. If not for his mentor, Edward Nourse, the leg would have been amputated, a common practice in those days. Instead, the fracture was reduced, and it healed over time. After a lengthy recuperation from the fracture, Pott wrote surgical textbooks; in 1768, he described the fracture that he himself had sustained with the following classic description:

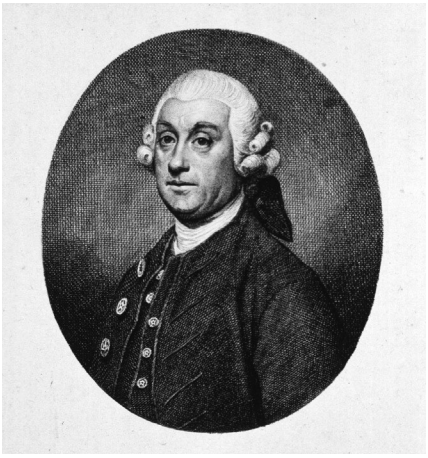

*Figure 2: Percivall Pott*

''When the fibula breaks within two or three inches of its lower extremity, the inferior fractured end falls inwards towards the tibia, that extremity of the bone which forms the outer ankle is turned somewhat outward and upward, and the tibia having lost its proper support is forced off from the astragalus inwards, by which means the weak bursal or common ligament of the joint is violently stretched if not torn, and the strong ones which fasten the tibia to the astragalus and os calcis are always lacerated, thus producing a perfect fracture and a partial dislocation to which is sometimes added a wound in the integuments. All of the tendons which pass behind or under, or are attached to the extremities of the tibia and fibula or os calcis, have their natural direction so altered that they all contribute to the distortion of the foot and that by turning it outward and upward. ''It is extremely troublesome to put to rights, still more so to keep it in order, and unless managed with address and skill is very frequently productive of lameness and deformity ever after, but if the position of the limb be changed, if by laying it on the outside with the knee moderately bent, the muscles forming the calf of the leg and those which pass behind the fibula and under the os calcis are all put in a state of relaxation and non-resistance, all this difficulty and trouble do in general vanish immediately, the foot may easily be placed right, the joint reduced, and by maintaining the same disposition of the limb everything will in general succeed very happily.''[7]

Pott was the first to describe environmental influences on disease: he linked chimney sweeping with the development of scrotal cancer. One of his pupils was John Hunter, who later became one of the greatest anatomists of the time and the founder of experimental pathology in England. After making a house call in foul weather, Pott fell ill. Feeling he was nearing his end, he stated, ‘‘My lamp is almost extinguished: I hope it has burned for the benefit of others.’’[6] He died of pneumonia on December 22, 1788.[6,8,9]

A Pott fracture is a fracture-dislocation of the ankle, involving a fracture of the fibula, disruption of the deltoid ligaments, and an intact tibiofibular ligament. This results in a lateral displacement of the talus.

**Dupuytren Fracture**

Guillaume Dupuytren (Fig. 3) was born the son of an impoverished advocate in Pierre-Buffière, France, on October 5, 1777. Although he wanted a career in the army, his father convinced him to get into the medical profession. He studied in Paris beginning at age sixteen. It is said that he was so impoverished that he took the fat of the cadavers used for dissection education to make oil for his lamp. At the age of eighteen, he became prosector at his medical school and was in charge of all autopsies. In 1803, he acquired his doctorate from the University of Paris, which was delayed because of the suppression of medical schools by the revolutionary government. In 1808, he became a surgeon at the Hôtel-Dieu in Paris. Beginning in 1815, he held the position of chief of surgery there for more than twenty years. His merciless, obsessive-compulsive personality and absolute perfectionism gained him the nicknames ‘‘Brigand d’Hôtel-Dieu,’’ ‘‘Napoleon of surgery,’’ and ‘‘first among surgeons, last among men.’’[10] However, he was a great lecturer with an amazing memory for case histories, medical studies, and details, making him an outstanding diagnostician and teacher.

*Figure 3: Baron Guillaume Dupuytren*

Because Dupuytren loathed writing, his students published his lectures and investigations. These reports cover the entire surgical field of that time. In his prime, Dupuytren saw 10,000 patients a

year. The money that he acquired was once used to help Charles X, who was dethroned and in need of money. A gift of one million francs came with the notion that Charles could receive another million for his daughter and a third for his old age, but the king declined. Dupuytren was made a baron by Louis XVIII and was also appointed his personal surgeon. In addition, he was the first surgeon to Charles X.

In 1833, Dupuytren had a stroke while giving a lecture, forcing him to retire from the Hôtel-Dieu in 1834. He died in Paris on February 8, 1835. He left 200,000 francs to the medical faculty; they used it to found the Musée Dupuytren, which still exists today.[10,11]

A Dupuytren fracture of the fibula is located 1 inch above the syndesmosis (low Dupuytren) or 2.5 to 3 inches above the syndesmosis (high Dupuytren).[11,12]

**Volkmann Triangle**

Richard von Volkmann (Fig. 4) was born in Leipzig, Germany, on August 17, 1830. After attending medical schools in Giessen, Halle, and Berlin, he started working as a professor of surgery at the University of Halle in 1867. Besides his contributions to the medical literature, he also wrote fairy tales and poems, illustrated by his son, under the pen name of Richard Leander.

*Figure 4: Richard von Volkmann*

In 1881, he described the contraction of fingers after a compression injury, now called a ‘‘Volkmann contracture.’’ He died in Jena, Germany, on November 28, 1889. An avulsion of the posterior lateral edge of the distal part of the tibia or a posterior malleolus fracture, in the case of a fracture-dislocation of the ankle, is called a ‘‘Volkmann triangle.’’

However, this eponym is debated because, in his original article, Volkmann primarily described examples of an avulsion of the lateral aspect of the distal part of the tibia in the sagittal plane. The first description of a case of an avulsion fracture of the posterior part of the tibia actually was accredited to Henry Earle in 1828.[13–15]

**Bosworth Fracture**

Professor David Marsh Bosworth (Fig. 5) was born the son of a minister in New York City on January 23, 1897. Bosworth graduated cum laude from the Medical School of the University of Vermont in 1921. In 1926, he started his residency in orthopaedic surgery at the New York Orthopaedic Hospital. In 1968, he received a Japanese award, ‘‘The Second Order of the Sacred Treasure,’’ for his contributions to orthopaedic surgery; he is the only foreign recipient of this award. His most important medical contribution was the introduction of streptomycin for the treatment of bone and joint tuberculosis.

A dedicated surgeon, after working in New York during the week, Bosworth flew his own plane to Vermont to teach and operate on the weekend. His evenings and Sundays were filled with photography and writing. All of his publications featured his own photographs. He remained in active practice until the age of eighty-two; he died on July 11, 1979.[16]

*Figure 5: David M Bosworth*

Described by Bosworth in 1947, a fracture of the distal part of the fibula with an associated fixed posterior dislocation of the proximal fibular fragment, which becomes trapped behind the posterior tibial tubercle, is called a ‘‘Bosworth fracture.’’ This is a variation on the entrapment of an intact fibula behind the tibia, which was first described by Ashhurst and Bromer in 1922.[17,18]

**Maisonneuve Fracture**

Jacques-Gilles Maisonneuve (Fig. 6) was born in Nantes, France, on November 10, 1809. He studied in Nantes and later became a surgical student under Dupuytren in Paris. He was the first to describe external rotation as the reason for a specific type of ankle fracture. He died in Missilac, France, on April 9, 1897.[19]

A fracture of the proximal third of the fibula associated with a medial ankle injury is called a “Maisonneuve fracture.” With use of cadaver studies, Maisonneuve described how an external

*Figure 6: Jacques-Gilles Maisonneuve*

rotation force applied to the foot could result in a fracture of the proximal third of the fibula.[19] In the case of an isolated medial malleolar fracture or medial ankle ligament rupture, it is now common practice to exclude a proximal fibular fracture, which is indicative of a rupture of the syndesmosis and the entire interosseous membrane.[20]

**Le Fort-Wagstaffe Fracture**

Léon Clément Le Fort (Fig. 7) was born on December 5, 1829. He studied medicine in Paris, and after serving for two years as a volunteer in the French army during the Italian War, he became prosector of the faculty in Paris. In 1870, he again joined the army to become the head of a voluntary field hospital in Metz during the Franco-Prussian War. In 1873, he became a professor of operative surgery at the medical faculty. He died on October 19, 1893.

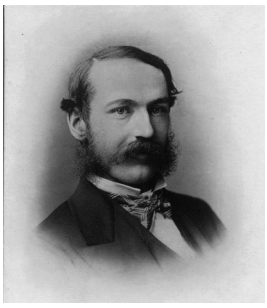

*Figure 7 and 8: Léon Le Fort and William Wagstaffe*

Le Fort discovered and described the direct communications between the bronchial and pulmonary vessels. He advocated the principles of asepsis before scientific bacteriology was developed. A classification of facial fractures was described by his nephew and godson, René Le Fort (1869-1951).[21]

William Warwick Wagstaffe (Fig. 8), the son of a surgeon, was born in London in 1843. He worked at St. Thomas' Hospital. He became a bachelor of medicine in 1867 at the University of London and obtained a fellowship in the Royal College of Surgeons in 1868. He was struck down by an obscure nervous malady, which slowly but steadily removed all his ability for physical activity.[22] He was lucid and fluent as a lecturer and demonstrator, holding the attention of the class, which was always orderly and well behaved at a time when the lecture room occasionally became quite rowdy. He died on January 22, 1910. At that time, he was a consulting surgeon to

the local hospital in Sevenoaks. He was praised in his obituary: "no word of complaint leaving his lips and remaining the genial kindly spirit his friends had known, physically incapacitated, but mentally as bright and active as ever."[23]

A vertical fracture of the anteromedial portion of the fibula (Wagstaffe tubercle)[24] at the site of the anterior tibiofibular ligament is called a "Le Fort-Wagstaffe fracture."[25]

**Tillaux-Chaput Fracture**

Paul Jules Tillaux (Fig. 9) was born in the region of Calvados, France, on December 8, 1834. He became a surgeon in 1863 and a professor of surgery in Paris in 1890. From 1868 to 1890, he was director of the Amphithéâtre d'Anatomie des Hôpitaux de Paris. During experiments on cadavers in 1892, Tillaux discovered that stress to the anterior inferior tibiofibular ligament could lead to a certain type of avulsion-type fracture of the tibia. This is recognized as a Salter-Harris type-III fracture that occurs in a specific period during adolescence when there is a differential rate of closure of the distal tibial physis, resulting in a closure of its medial portion before the lateral portion closes. Tillaux died in October 1904. He was buried at Père-Lachaise Cemetery in Paris.[26–28]

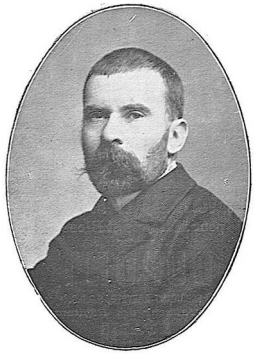

*Figure 9 and 10: Paul Tillaux and Victor Chaput*

Henri Victor Alexander Chaput (Fig. 10) was born in Tonnerre, France, in 1857. He began studying medicine in Paris in 1876. His third year of study was spent in the Beaujon Hospital, where Tillaux awakened his interest in anatomy. He successfully defended his thesis on old fractures of the patella; in 1885, he received the silver medal of the faculty of medicine for this thesis. Most of his career he worked in Lariboisière. In 1901, Chaput developed surgical gloves that could be sterilized in an autoclave, but these were meant to protect the skin, not to be aseptic. These gloves remained in use until the advent of disposable gloves in 1970. In 1914, Chaput became a consulting surgeon for the French army. As such, he treated his own son, who was seriously wounded as a fighter pilot. His son returned to active duty but was injured again, this time fatally. Shortly after, overwhelmed by grief, Chaput died in February 1919.[28]

The Salter-Harris type-III fracture of the anterolateral tibial epiphysis that is commonly seen in adolescents after the closure of the medial portion of the physis is called a ‘‘Tillaux fracture.’’ It is the result of a forced lateral rotation of the foot or medial rotation of the leg on a fixed foot. This mechanism results in an avulsion injury through the strong anterior tibiofibular ligament, which attaches to the lateral epiphysis. This injury was described by Tillaux in 1892 and, later on, Chaput described a similar injury of the posterolateral aspect of the tibia, which is called a ‘‘Tillaux-Chaput fracture.’’

**Lauge-Hansen Classification**

Niels Lauge-Hansen (Fig. 11), the son of a farmer in Jerne, Denmark, was born on May 21, 1899. In 1925, he finished his study of medicine. From 1926 to 1927, he served in the navy, undertaking expeditions to Iceland and the Faroe Islands. In 1942, he published his thesis ‘‘Ankelbrud’’ (ankle fracture) while working at the Bispebjerg Hospital in Copenhagen. Beginning in 1943, he worked as head of the radiology department of the Central Hospital in Randers. In 1950, he became a member of the main board of the National Association for Combating Rheumatic Diseases. From 1959 to 1961, he worked in Seoul, South Korea, and was made an honorary member of the Korean Medical Association.

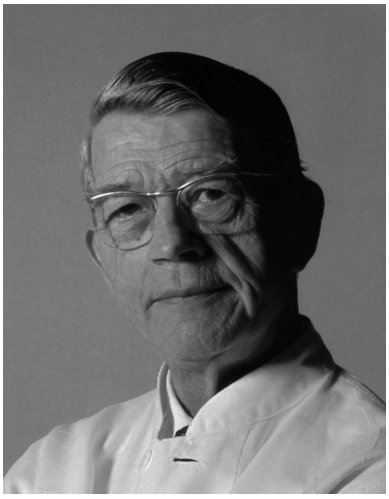

*Figure 11: Niels Lauge-Hansen*

Lauge-Hansen was a man of short stature who hated to look up to others. As a result, he arranged for the legs of two chairs used at his desk by visitors to be shortened. By reports, this desk is still in use in the radiology department of the Central Hospital in Randers. With use of cadaver specimens in the 1940s and 1950s, he elucidated the mechanisms involved in ankle fractures. He wrote his key publications on the subject, five articles describing five basic mechanisms of ankle injury, between 1948 and 1956.

This classification system was based on the stability of the ankle mortise, not only the dislocation and the type of fibular fracture. As defined by Lauge-Hansen, the five basic mechanisms of ankle injury are described by two words. The first word refers to the initial position of the foot at the time of injury; the second word describes the direction

of the injuring force through the talus. This results in the following possible mechanisms: supination-adduction, supination-eversion, pronation-eversion, pronation-abduction, and pronation-dorsiflexion.[29–33] The trauma mechanism is meant to guide one to the fracture type and vice versa, although this is not always easily achieved in daily practice. He created a very complete but quite complicated classification system. Because of its complexity, the classification system is not always used, ironically not even in the Central Hospital in Randers (personal communication).

**Danis-Weber Classification**

Robert Danis (Fig. 12) was born in Oudenaarde, Belgium, in 1880. He studied in Brussels and graduated in 1904. He first became interested in thoracic surgery, followed by anesthesia and then vascular surgery. In 1913, he started working in a hospital in a poor area of Brussels. Because there was no capacity for patients to stay over after surgery, this hospital became the first one-day clinic in Belgium where patients could have surgery for hernias, varices, and breast masses. Follow-up was done in a patient's home.

Danis started early with the operative treatment of fractures. In 1907, the term ''ostéo-synthèse'' had been coined for the first time by Lambotte, who promoted the operative treatment of fractures.[34] Danis followed this principle and designed a tension apparatus for fracture compression and fashioned his own screws with instrumentation. His curiosity reached beyond the borders of medicine. He was fond of astronomy and designed his own motor vehicle in 1919 because it was too expensive to buy a car.[34]

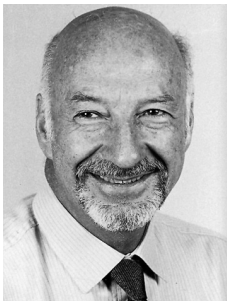

*Figure 12 and 13: Robert Danis and Bernhard Weber*

Bernhard Georg Weber (Fig. 13) was born in 1927. He studied medicine in Basel, Switzerland. In 1959, he began work under Maurice E. Müller in St. Gallen. Weber's ideas enriched those of Müller and they helped develop the AO Foundation, which was in its infancy at the time. Weber succeeded Müller in 1967. He had more than 180 publications, which is remarkable for a man who found writing articles ''an act of self-gratification.''[35] He was most interested in describing his experiences, ranging from the description of pseudarthrosis to the

classification of malleolar fractures in well-documented books. After his retirement in 1986, he continued to work full-time in private hospital practice. He died in 2002.

The Danis-Weber classification is a method of describing ankle fractures with three categories that focus solely on the fibula. Type A is a fracture of the lateral malleolus distal to the distal tibiofibular syndesmosis, type B is a fracture of the fibula at the level of the syndesmosis, and type C is a fracture proximal to the syndesmosis. This system was first described by Danis in 1949 and modified and popularized by Weber in 1972.[3,4] It is a simple and easy-to-memorize classification that is frequently used.

**Discussion**

Opponents of eponyms point to the lack of accuracy, intentional misuse, (accidental) erroneous use, and unintentional or unethical attribution.[1] Proponents advocate for eponyms to be retained because they are ‘‘often practical’’ and provide insight into medical history and tradition.[2] Our personal position in this discussion is with the proponents, but only when eponyms are used correctly.

In our opinion, the importance of this report is twofold. First, daily clinical work and communication between colleagues is substantially improved when there is no confusion about nomenclature or the description of encountered pathology.

With its description of various ankle fractures, this article helps to facilitate the accuracy and appropriate use of eponyms. Secondly, awareness of the eponyms helps to preserve orthopaedic traditions and history and also commemorates important individuals. Inaccurate or inappropriate use of eponyms can be prevented with appropriate knowledge.

The information provided on the various fracture descriptions in this article was retrieved, whenever possible, from the original publication written by the individual whose name is attached to the term. These publications were studied meticulously while preparing this manuscript. In some cases, the information in the primary source was not clearly presented.

For example, over the last century, radiographic imaging has developed from unclear images to high-definition imaging techniques, leading to a new interpretation of certain pathologies (e.g., calcaneal apophysitis initially was mistaken for a calcaneal fracture).[5] The original man-

uscripts were matched with our current knowledge of fracture pathophysiology, terminology, and nomenclature in order to provide the best available evidence-based description of these ankle fractures.

**Acknowledgement**

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# CHAPTER 15

## Eponyms of the Kager triangle

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*J Bone Joint Surg Am. 2012 May 16;94(10):e67*

## Introduction

The area of the Kager triangle contains numerous structures, diseases, approaches, or tests that are described with the use of eponyms.[1–6] Even the triangle itself is an eponym, named for Dr. Hans Kager.[7] The Kager triangle, also known as the pre-Achilles fat pad, is the region bordered by the superior part of the calcaneus, the flexor hallucis longus tendon, and the Achilles tendon.[7,8]

Much has been written about eponyms[9,10], and the use or misuse of eponyms has been discussed previously.[11–14] Recent publications have questioned whether eponyms should be used in medical practice or merely be reserved for use by those interested in the historical perspective[15–17], but, to date, no consensus has been reached. Although the use of eponyms can cause confusion for scientific and clinical purposes, they remain a tribute to the pioneers of anatomy and pathology.[18,19] The problem with eponyms seems to be that the original description sometimes has been forgotten or replaced by more recent authors, leading to different meanings.[1,19–29] We performed an extensive review of the scientific literature to identify the original publication that described the exact structure and pathology of the area of the Kager triangle in order to provide a clear overview of its multiple eponymous structures and diseases (Fig. 1, Table I).

*Table 1: Overview of eponymous structures and corresponding non-eponymous terminology.*

| Eponym | Common non-eponymous term |
|---|---|
| Achilles tendon | Calcaneal tendon |
| Albert's disease | Retrocalcaneal Bursitis |
| Ligament of Rouvière (and Canela Lazaro) | Fibulotalocalcaneal ligament |
| Sever's disease | Calcaneal Apophysitis |
| Stieda's process | Posterior talar process |
| Shepherd fracture | Fracture of posterior talar process |
| Haglund exostosis | Posterosuperior calcaneal exostosis |
| Haglund disease | Varies |
| Haglund syndrome | Varies |
| Van Dijk arthroscopic procedure | 2-portal posterior ankle arthroscopy |
| Kager's triangle/fat pad | Pre-Achilles fat pad |
| Thompson (-Simmonds) test | Calf squeeze test |

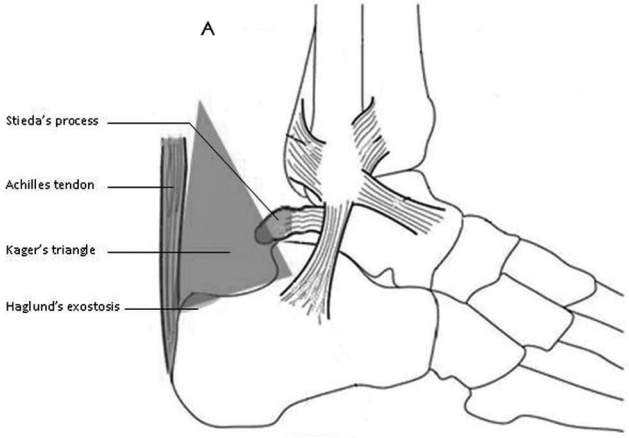


*Figure 1: anatomical structures in and around Kager's triangle. Indicated are: Stieda's process, Achilles tendon, Kager's triangle and Haglund's exostosis.*

**Achilles Tendon**

The Achilles tendon is located on the posterior border of the Kager triangle. The most well-known tendon of the human body was named after Achilles, a hero in the Trojan War and the main character in the Iliad by Homer. In 1693, Philip Verheyen, a Dutch surgeon, was the first to actually name the Achilles tendon after the Greek hero.[30] Prior to that time, it was known as the ''tendo magnus of Hippocrates.''

Only one source recounts the story of Achilles as invulnerable after his mother, holding him by the heel, submerged him in the river Styx in the underworld of Hades.[31] Everything the waters touched became invulnerable, but the heel remained dry and unprotected, and thus remained susceptible to injury. Statius states that Achilles was killed by an arrow that wounded his heel,[31] while other authors simply state that Achilles was killed by arrows or a poisoned arrow. Homer even describes Achilles as being wounded in battle, which raises questions about his invulnerability. Interestingly enough, Homer does not describe Achilles' death.

**Albert Disease**

In 1893, Eduard Albert published an article on achillodynia, which literally means pain at the Achilles tendon.[1] He described a patient who experienced intense pain at the insertion of the Achilles tendon while standing and walking. He described the area of insertion as bulging.

Currently, Albert disease is synonymous with retrocalcaneal bursitis.[32] Endoscopic treatment for this entity has gained popularity over the last decade.[28,33,34]

Albert, born on January 20, 1841, was the son of a watchmaker in Žamberk, Kingdom of Bohemia, the Austrian Empire (currently the Czech Republic). He studied medicine at the University of Vienna and received a doctor of medicine degree in 1867. Albert became an operator and assistant under Johann von Dumreicher (1815 to 1880) in the surgical clinic of Vienna. He was appointed full professor at the surgical clinic in Innsbruck in 1873. In 1881, he was appointed to the more prestigious chair of surgery in Vienna, a position he held until 1900. Albert learned of Joseph Lister's antiseptic procedures and introduced these in Innsbruck, making antiseptics mandatory during the treatment of all wounds. According to Albert, a total revision of surgical practice was necessary to instill these principles. His Lehrbuch der Chirurgie was the first surgical textbook based on the principles of antiseptic treatment. In addition, Albert is remembered for producing ''artificial ankyloses'' in paralyzed limbs. He was the first to use the term ''arthrodesis,'' and he performed tarsal and shoulder arthrodesis for patients with paralysis and recurrent dislocations.[35] After Albert's death, some of his properties in Žamberk were sold to fund a sanatorium that still carries his name today, the Sanatorium Albertinum.[36]

**Ligament of Rouvière and Canela Lazaro**

In 1932, Rouvière and Canela Lazaro described the fibulotalocalcaneal ligament, also known as the ''Rouvière ligament'' or the ''ligament of Rouvière and Canela Lazaro'' (Fig. 2).[3] The Rouvière ligament is an extrinsic sheath like ligament that occupies the posterolateral corner of the ankle and the posterior aspect of the subtalar joint. It originates from the medial border of the peroneal groove on the posterior border of the lateral malleolus, in common with the origin of the posterior tibiofibular ligament, and frequently reaches the origin of the calcaneofibular ligament.[37] The ligament is known because of its influence on the two-portal posterior ankle arthroscopy (also known as the the van Dijk hindfoot approach). Van Dijk describes how the ligament prevents the arthroscopist from entering the ankle joint through the posterior portals and advises that the ligament be cut.[38] Since cutting the ligament has not been shown to cause any problems[38–40], its exact biomechanical function remains to be determined.

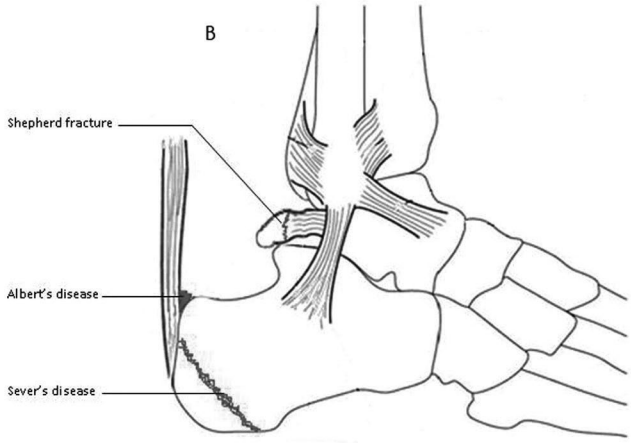


*Figure 2: Pathology around Kager's triangle. Indicated are: Shepherd fracture, Albert's disease and Sever's disease*

*Figure 3: Structures around the dorsal side of the (right) ankle, highlighted in red is the Rouvière ligament*

Henri Rouvière, a French anatomist and embryologist, was born in Le Bleymard, (Lozère) France on December 23, 1875. He studied medicine in Montpellier, where he received his doctorate in 1903. In 1910, he became an associate professor of anatomy and embryology at the medical faculty of the University of Paris. He became a full professor of anatomy at the same institute in 1927. Rouvière is well known for the eponymous ''node of Rouvière'' (the most superior node of the lateral group of retropharyngeal lymph nodes). This node is described in his 1932 publication, Anatomie des Lymphatiques de l'Homme, an extensive study describing and classifying the human lymph nodes and associated drainage regions.[41] Rouvière died on October 26, 1952. Many of his anatomical works can be found in the Parisian Musée d'Anatomie Delmas Orfila-Rouvière.[42]

Miguel Canela Lázaro was born on September 29, 1894 in the city of Santiago de los Caballeros, Dominican Republic. In 1914, he enrolled at the University of Santo Domingo, where he studied mathematics and engineering. He became a professor of mathematics and natural sciences at the Ecole Normale de Santo Domingo. Probably influenced by his friend, the prominent surgeon Pascasio Salcedense Toribio, he decided to study medicine and received his degree in 1924.He went to Paris to work in the Laboratory of Anatomy at the Faculty of Medicine of the University of Paris (now known as the Paris V, René Descartes University) under the supervision of Henri Rouvière. Together, they investigated the ligaments of the ankle and found a ligament never previously mentioned in the anatomical literature: the fibulotalocalcaneal ligament.[3] Later, Canela Lázaro worked with Manoutchehr Hakim and discovered another ligament: the superficial fascicles of the posterior sacroiliac ligament, also known as the Hakim-Canela ligament.[43] On December 1, 1977, Canela Lázaro died in Santo Domingo at the age of eighty-three.

**Sever Disease**

Sever disease or Sever injury, also known as calcaneal apophysitis, is a traction epiphysitis of the calcaneus.[4] Sever disease is common in active, frequently overweight, children. Boys are more often affected than girls. Symptoms appear around the age of seven to fifteen years in boys and eight to thirteen years in girls.

The incidence of Sever disease has been reported to be between 2% and 16%[44–46] of all musculoskeletal injuries, and it is the most common cause of heel pain in the growing child. Children may experience pain over the apophyseal area, which extends up to the insertion of the Achilles tendon, in one or both (in 60% of children with Sever disease[44–46]) heels. Despite its prevalence, there is only marginal evidence for any effective treatment of Sever disease, which tends to resolve with skeletal maturity.

James Warren Sever, an American orthopaedic surgeon, was born in Kingston, Massachusetts in 1878 and died in 1964.[47] He studied medicine at Harvard Medical School, where he received his degree in 1901. Sever served as an instructor in orthopaedic surgery (1922 to 1929) and an assistant professor of orthopaedic surgery (1929 to 1946) at Harvard Medical School.In addition, he served at Children's Hospital Boston for forty years and was an associate surgeon at three other hospitals. For more than fifty years, he was the medical director of the Industrial School for Crippled and Deformed Children in Boston.[48] Sever authored several books and

scientific articles, and, in 1912, he published a study on ‘‘apophysitis of the os calcis’’.[4,49] This common cause of heel pain in children is now referred to as Sever disease.

**Stieda Process**

The lateral tubercle of the posterior talar process is also known as the ‘‘Stieda process.’’ This posterior talar process consists of a medial and lateral tubercle, separated by a groove in which the flexor hallucis longus tendon runs. The Y-shaped, bifurcate talocalcaneal ligament forms a roof over this groove and inserts onto each tubercle. The posterior talofibular ligament inserts at the lateral tubercle of the talus.[6] When the tubercle is not ossified, it is called an ‘‘os trigonum’’.[50] A prominent posterior talar process, an os trigonum can cause posterior ankle impingement syndrome and can be treated by means of an open or arthroscopic procedure.[39,40,51]

Christian Hermann Ludwig Stieda, a German anatomist, was born in Riga (currently Lithuania), on November 19, 1837.[52] He received his medical education in Dorpat (currently Estonia), where he won a silver medal in anatomy. After receiving his degree in 1861, he went to Giessen University in Germany, where he studied the anatomy of worms. In 1862, he moved to Vienna, where he studied histology. Stieda was appointed prosector at Dorpat in 1864, and, in the following year, he became a lecturer on comparative anatomy in the veterinary school at the same institute. In 1866, he was elected extraordinary professor of anatomy, and, nine years later, he became a full professor in succession of his teacher Dr. Reissner. He held this chair for ten years, and was Dean of the Medical faculty for the last three years of this period.[52] In 1885, he was appointed director of the anatomical institute in Königsberg, where he remained until his retirement in 1912. Stieda died on his birthday in 1918.[52] He authored several publications on the history of medicine, archaeology, anthropology, and ethnography. His son, Alexander (1875-1966), became a famous German neurosurgeon.

**Shepherd Fracture**

A Shepherd fracture is a fracture of the lateral tubercle of the posterior process of the talus (the Stieda process). Shepherd noted that the fracture caused no deformity and only vague symptoms.[5] The posterior process is susceptible to injury. It is a relatively common fracture in soccer players and ballet dancers, caused by hyperplantar flexion of the foot. A Shepherd fracture can simulate an os trigonum in the eyes of a less experienced radiographic examiner.

Even dr. Shepherd himself sometimes had trouble differentiating between an os trigonum and a fracture of the lateral tubercle of the posterior talar process.[5]

Francis John Shepherd, a Canadian dermatologist, anatomist, and surgeon was born in Como, Quebec in 1851 and died in 1929. He graduated from McGill University in 1873. During his student days at McGill, Shepherd developed a friendship with William Osler, who he described as ‘‘a keen-eyed alert, spare young man with an enormous amount of energy’’.[53] After obtaining his degree at McGill in 1872, Osler subsequently became a staff member there. He wrote to Shepherd, suggesting that he apply for the position of demonstrator of anatomy at McGill, and Shepherd returned to the university in 1875. He became a full Professor of Anatomy in 1883 and remained so until 1913.

He also served as Professor of Dermatology from 1908 to 1913 and Dean of the Faculty of Medicine from 1908 to 1914, retiring as Emeritus Dean and Professor in 1919. In 1882, Shepherd published ‘‘A Hitherto Undescribed Fracture of the Astralagus,’’[5] a descriptive study of several dissecting room specimens: ‘‘the part fractured was the little process of bone external to the groove for the tendon of the flexor hallucis longus’’.[5] His findings gave rise to a long-lasting discussion. Well-known anatomists entered the discussion on the origin of the Shepherd fracture: was it a fracture or a separate ossicle? The idea that this fragment of bone was an ossicle was first described by Gruber and Stieda in the 1880s. Von Bardeleben termed the ossicle an ‘‘os trigonum’’. Shortly after Shepherd’s publication, professor Bennett stated it was an ossicle, not a fracture fragment.[54] Shepherd reacted after additional observations: ‘‘further investigation of the subject has led me to reject the theory that the ossicle, found at the posterior border of the astralagus, is due to fracture; I am now convinced that it is an un-united epiphysis, and has an origin from a separate centre of ossification’’.[53,54] To this day the discussion remains as to whether the fragment of bone is a Shepherd fracture or an os trigonum.

**Haglund Deformity, Syndrome, and Disease**

Dr. Patrik Haglund was not the first to report on bursitis of the retrocalcaneal bursa or its treatment.[26,55] He differentiated between several types of bursitis of the posterior calcaneal region and reported on the successful surgical treatment of retrocalcaneal bursitis.[2] To our knowledge, it was in 1958 that retrocalcaneal bursitis was first termed ‘‘Haglund disease’’.[56]

Currently, ‘‘Haglund deformity’’ is defined as a posterosuperior calcaneal prominence or exos-

tosis. Because the retrocalcaneal bursa may impinge between the deformity and the Achilles tendon, it can cause a retrocalcaneal bursitis. Because ‘‘Haglund syndrome’’ is the term for many different combinations of pathology, it can cause confusion. It is frequently described as a combination of an insertional Achilles tendinopathy, a retrocalcaneal bursitis, a superficial bursitis, and a posterosuperior calcaneal exostosis. Because of these different interpretations, it was recently proposed to not use the term ‘‘Haglund’’ to describe pathologies involving the posterior part of the calcaneus.[16]

Likewise, the term ‘‘Haglund disease,’’ which is sometimes known as osteochondrosis of the accessory navicular bone (or os tibiale externum)[22,27,57], has caused confusion. As a result, it has also been proposed to not use the term ‘‘Haglund disease’’ in clinical practice.[16]

Haglund was born the son of a doctor in Norrköbing, Sweden on May 27, 1870. After studying physics and astronomy for three years in Uppsala, he started studying medicine in 1891 and received a degree in 1899. He learned the principles of orthopaedic surgery mainly in Germany. At the time, this area of expertise was still underdeveloped. Like nearly all of his teachers, Haglund was mostly autodidactic. His thesis was called ‘‘Radiographic Studies of the Functional Structure of Spongious Bone in the Calcaneus.’’ During his career, he published as many as 300 manuscripts and books. The two main publications were Consequences of Paralysis in Children and Treatment’’ (1913) and Principles of Orthopedics (1923). Because Haglund was the only professor in orthopaedics in Scandinavia, he became a very important figure. In 1930, he founded Acta Orthopaedica Scandinavica. On December 8, 1937, Haglund died of a heart attack, which had been mistaken for a backache. When an injection was prepared for him, he supposedly said, ‘‘inte skall man ha spruta för rheumatism I ryggen’’ (because of rheumatism in the back, you don’t need an injection).[58]

**Kager Triangle/Fat Pad**

The Kager triangle or Kager fat pad is also known as the pre- Achilles fat pad. It is a lipomatous triangular structure bounded by the flexor hallucis longus muscle and tendon anteriorly, the superior cortex of the calcaneus inferiorly, and the Achilles tendon posteriorly8. The retrocalcaneal bursa forms the posteroinferior corner of the pad. With an Achilles tendon rupture, the triangle may appear deformed on a conventional lateral radiograph.

Dr. Hans Kager has a history that is hard to elucidate. Besides his principal work (1939) on the

treatment of Achilles tendon rupture[7], we did not find any other publications of his.

From the original publication, we can derive that, at the time, he was working at the Hohenlychen Sanatorium in Lychen, Germany. Karl Gebhardt, the Nazi doctor and personal physician of Heinrich Himmler, who stood trial at the Nuremburg Doctors' Trial and was sentenced to death for war crimes and crimes against humanity, was the head of Dr. Kager's department. To our knowledge, there is no additional information on dr. Kager's personal life, his work, or his political affinities. In his original publication, Kager mentions the triangle. The first time we found it cited as the term ''Kager triangle'' was in a 1977 German publication.[59]

## Discussion

This report provides an overview of eponymous structures, pathological approaches, and tests in the area of the Kager triangle. The question remains whether eponyms are a gift or a curse in daily medical practice. As described earlier, the benefits are obvious: eponyms are a tribute to the founder of the structure or disease.[9,10] In addition, eponyms are unaffected by language barriers. This is in contrast to many medical definitions (e.g., calcaneus or calcaneum). Indeed, the international recognition of a term may be the main advantage of eponymous annotations over anatomic nomenclature. Additionally, it may be considered a tradition to name a discovery after its founder.[9,10]

However, there are several disadvantages with the use of eponyms.[9,19] The accidental use, or worse, the intentional misuse or incorrect use of eponyms, is important to note.[12] For example, the well-known Thompson test for Achilles tendon ruptures was wrongly named after Dr. Theodore Campbell Thompson. The discoverer of this test was in fact dr. Franklin Adin Simmonds.[60] The calf squeeze test is commonly referred to as the Thompson test, or the Thompson-Simmonds test, rather than the Simmonds test.[60,61] The fact that eponyms are traditionally seen as a tribute to the founder makes them inevitably susceptible to misuse.[11] Whether or not everybody is justified in receiving such a tribute has been an issue of discussion, specifically in regard to the discoveries made by Nazi doctors.[14,62–67]

There has been a long-lasting debate whether or not unethical discoveries should be honored by any means, and whether they should be removed from the history books altogether.[14,62–64,68] Finally, the use of eponyms is also susceptible to accidental erroneous use, which can create overall confusion regarding a certain topic or entity (e.g., as discussed previously with the

Haglund eponym).[13,16,18] Some believe that daily medical practice would be less confusing if use of eponymous nomenclature is discontinued and replaced with a uniform terminology based on a combination of anatomic location, symptoms, clinical findings, and/or histopathology(Table I).[13,16,18,19]

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# CHAPTER 16

**Summary**

**General discussion and implications for daily practice**

**Implications for further research**

**Personal perspective**

## Summary

Eponymous terms are abundant in our daily language as well as in medical terminology. They became harder to recognize over time because they have lost their capital. Eponymous terms provide an easy shorthand but are prone to misinterpretation.[1,2] There are two groups that are directly opposed to each other in the discussion on whether eponymous terms should be used or not.[1–5]

In this thesis we studied the rationale of this discussion. We tried to establish how eponymous terms arise and what happens to their interpretation over time. We also looked at the current place of eponymous terms in our orthopedic practice.

**Chapter 1** provides a general introduction for this thesis and the aims and outline of the studies conducted.

*Part I: On the origin of eponymous terms*
In Part I we investigated the way eponymous terms come into existence and how they are referred to over time, and how a hyphenated or composite eponymous term could lead to confusion in the early days as well as now. By elucidating the bibliography and origin of an eponymous term the requirements of becoming an eponym are debated.

In **Chapter 2** we conducted a literature review to unravel the origin and changes over time concerning the Pellegrini-Stieda (PS) lesion. Whereas the original publications mention the medial collateral ligament (MCL) (Pellegrini) as well as the medial head of the gastrocnemius muscle (GM) (Stieda) as origin of a bony shadow on the medial side of the femoral side of the knee, nowadays the origin of the PS lesion is most often attributed solely to the MCL.

By analyzing all retrievable papers (N=37) on the PS lesion from 1905 onwards, we identified all proposed anatomic origins over time. The MCL was stated as the origin of the PS lesion in a majority of the papers (54%) and the GM in only 6%. When we excluded those papers that reported on the probable origin of the PS lesion without support of surgery or any additional radiological examination, the insights about the origin of this eponym changed. On MRI the MCL was seen in only in 25% of the papers as the sole origin and the GM in 0%. When surgery was performed, the number of papers that stated the MCL as origin was again 57% and the GM 7%. This might be explained by the possibility that mostly ossifications in the MCL become symptomatic, which might be an indication for surgical resection.

In 2006 the adductor magnus tendon was designated as the origin of the PS lesion on MRI. The MPFL was recently added to the list of possible origins, based on MRI findings. In the study by McArthur et al. there was ossification in 26% of all cases (N=27) located in the MPFL.[6] In all groups (all articles, MRI or/and surgery), roughly 25% did not establish any structure in particular to be the origin of the PS lesion.

Today the exact origin of the PS lesion is still unknown. The term is applied to a wide variety of muscular/tendon lesions on the medial side of the knee in our daily practice.

Because of the ongoing debate on whether a PS lesion is a lesion in the MCL or the GM, as was respectively described by Pellegrini and Stieda, we tried to reproduce the radiological observations of their original studies from 1905 and 1908. We wanted to study whether ossifications in the MCL and the GM look alike on conventional X-rays. In **Chapter 3** we report on a study of cadaveric knees**.** We identified either the MCL or the GM in six cadaveric knees and injected radio-opaque fluid into the structures in order to visualize them on an X-ray. These photos were compared with the original images from the publications of Pellegrini and Stieda. The X-rays of the lesions were compared to each other and evaluated by an independent researcher to assess whether he could distinguish an MCL lesion from a GM lesion on a plain radiograph (AP). It turned out that he was unable to establish on the X-rays which anatomical structure was marked. After measuring the distance from the most proximal part of the radio-opaque marking in either the MCL or the GM to the tibial plateau, another comparison was made. This type of measurement was chosen since the MCL origin is slightly higher on the femoral condyle in an extended knee than the origin of the medial head of the GM. Only in two out of three cases (66%) the marking on the X-rays was interpreted correctly for both the MCL and the GM.

This study shows that it is unreliable to make a distinction on an X-ray between an ossification in the MCL or the GM. It therefore remains unknown which anatomical structure is affected in case of a PS lesion.

**Chapter 4** elaborates on the search for the origin of eponymous terms. How will an eponymous term arise and evolve over time? To this end we investigated the eponymous term Kager triangle. We conducted a historical background study on the eponym, Hans Alois Kager. It showed that Kager had only one known publication from 1939 on Achilles tendon ruptures where he described the so-called Kager triangle but did not name it after himself. Nineteen years passed before the first reference to the eponymous term Kager triangle was made. The term “Kager triangle” was found in a paper by Arner in 1958.[7] When Kager published his paper he was

working at the Hohenlychen Sanatorium, which got a dubious reputation in history under Nazi rule. He very likely never participated in or was a witness to the crimes against humanity that took place there, since he joined the army and became a casualty of war in 1941. Our research demonstrates that a single publication can lead to the author becoming an eponym.

*Part II: The (presumed) fall of eponymous terms*

After focusing on the origin of eponymous terms, we shifted our research to the current use of these terms. Different aspects are analyzed: confusion can arise when the meaning of an eponym is not well defined. The same goes for a test that is not descriptive but eponymous. We also looked at the current use of eponymous terms in the Netherlands and internationally. We evaluated the reliability of the use of eponymous terms and whether our peers choose to use eponymous terms instead of classifications or descriptive terms. The purpose of all this is to get an impression of whether we should use or abandon eponyms and eponymous terms in current medical communication.

By means of analyzing the Simmonds-Thompson test, in **Chapter 5** we discuss the importance of understanding and interpreting the results of this clinical eponymous test. There will be confusion if the assumed meaning of a 'positive' test is different among professionals. In general, the result of a clinical test can be called positive or negative, depending on the expected outcome. Because the Simmonds-Thompson test is a diagnostic tool for Achilles tendon rupture and not a test indicative of an intact tendon, the absence of foot plantar flexion on calf compression should correctly be interpreted as a positive test result. Biographically it is striking that both eponyms were not fond of their given names (Franklin and Theodore) and preferred nicknames (Sam and Tommy). This article clarifies the possibility of miscommunication with eponymous tests, therefore one must always make sure nondescriptive tests are properly conducted and interpreted.

**Chapter 6** reports on the results of a nationwide Dutch survey among orthopedic surgeons about the use and knowledge of eponymous terms in daily practice. The survey was meant to establish an overview of the modern use of eponymous terms. We also analyzed differences in the knowledge and use of eponymous terms depending on the surgeon's area of interest and years in practice. A total of 58 out of 67 surveys were returned and filled out completely. There was no significant difference between the groups when comparing years of experience to the eponymous terms the respondents use and know. Orthopedic surgeons who chose "general orthopedics", "trauma" and/or "upper extremity" as their region of interest knew significantly more eponymous terms that were from that region of interest than orthopedic surgeons who

chose other regions of interest (“pediatrics”, “spine”, “lower extremity”, “sport”). It seems that super-specialization, rather than modern training or diminished interest in the use of eponyms in general might contribute more to a possible decrease of eponymous terms usage in daily practice.

For **Chapter 7** we conducted a systematic review to establish whether there is a consensus in the meaning of the eponymous terms and whether the terms correspond with the original description. We selected 12 well-known eponymous terms in shoulder and elbow surgery. To get a fair amount of articles per term, there had to be more than 10 hits per eponymous term. This resulted in six terms that had more than 10 hits, and these were eligible for analysis. We analyzed 96 articles, with 27 (28%) scoring an interpretation that was divergent from the original description. Overall, in 32 (33%) articles the meaning of the eponymous term remained undefined. Only 37 (39%) articles used an interpretation that was similar to the original description. Bristow-Latarjet scored lowest, with 0% correspondence of the used meaning with the original description. This means that all articles on Bristow-Latarjet had an undefined or divergent meaning. Essex-Lopresti scored highest, with 82% of the articles using a similar description compared to the original article. We concluded that the eponymous terms were used inadequately and inconsistently, which may contribute to misinterpretation of research results and give rise to miscommunication.

To establish the reliability of the use of eponymous terms we conducted an international survey in **Chapter 8**. By means of an online survey, 224 orthopedic surgeons (from all over the world) were quizzed on two domains. First they were asked 10 questions to link a common eponymous term with the original description that was placed among slightly divergent descriptions. The correspondence of each eponymous term with its original description (termed appropriate use) was calculated with 95% confidence intervals. We measured the reliability of the use of eponymous terms using the Kappa statistic and proportion of agreement. The percentage of appropriate use averaged 45% (range from 27% for Barton fracture to 75% for Sever disease), with greater misuse among European surgeons. The reliability of the use of eponymous terms was low (Kappa 0.11, proportion of agreement 0.68).

The second part of the survey was conducted on how orthopedic surgeons describe 10 conditions and structures to their peers. The answers consisted of eponymous terms, descriptions and classifications. Eponymous terms were generally chosen more often than anatomical descriptions or classifications. Overall, 74.7% of the answers consisted of an eponymous term. Support for using eponymous terms in daily practice was significantly lower among surgeons

practicing in North America (63%) than among their colleagues from Europe and South America (80%: $p < 0.001$).

We concluded that eponymous terms are an inaccurate and unreliable method of communication but that surgeons nevertheless choose to use them. It is highly possible that each surgeon is convinced he/she knows the correct meaning of the eponymous term. This study could change the use of eponymous terms, either by making sure one knows the meaning or by using the terms less often.

*Part III: In case eponymous terms are here to stay*

Since we established that eponymous terms are used frequently but their use is prone to misinterpretation, it is important to know the original meanings of various eponymous terms. Hence in this third section a fair number of eponymous terms common in orthopedic surgery will be clarified. For each eponymous term we searched for the key publication, and present the findings. This is accompanied by a short biography of the eponym. The goal was to also present the current clinical relevance of these eponymous terms. This section is arranged by anatomical orientation from cranial to caudal. All papers are descriptive and therefore lack a general conclusion despite the general connection of the items to eponymous terms, as presented earlier in this thesis.

In **Chapter 9** we studied eponymous terms associated with anterior shoulder instability: the Perthes lesion, Bankart lesion and repair, Hill-Sachs lesion, Bristow-Latarjet procedure and Eden-Hybbinette procedure.

**Chapter 10** focuses on eponymous terms related to injuries of the elbow region. Here we discuss the Holstein-Lewis fracture, Essex-Lopresti injury, Volkmann contracture, Kocher incision, Monteggia fracture-dislocation, Galeazzi fracture-dislocation and Kaplan approach.

**Chapter 11** discusses the pelvis. Eponymous terms discussed are the Duverney fracture, Malgaigne fracture, Judet-Letournel classification, Kocher-Langenbeck approach and Stoppa approach.

Approaches to the hip joint are the scope of **Chapter 12**. It discusses the Smith-Petersen, Watson-Jones, Hardinge, Charnley, Southern or Moore, and Ludloff eponymous approaches.

The knee joint is the focus of **Chapter 13**. Eponymous terms discussed are the Gerdy tubercle, Pellegrini-Stieda lesion, Segond fracture, Hoffa fracture and Hoffa fatpad.

In **Chapter 14** we discuss fractures in the ankle region. Eponymous terms discussed are the Pott fracture, Dupuytren fracture, Volkmann triangle, Bosworth fracture, Maisonneuve fracture, Le Fort-Wagstaffe fracture, Tillaux-Chaput fracture, Lauge-Hansen classification and Danis-Weber classification.

The posterior part of the ankle known as the Kager triangle is discussed in **Chapter 15**. Eponymous terms discussed are the Achilles tendon, Albert disease, ligament of Rouvière and Canelo Lazaro, Sever disease, Stieda process, Shepherd fracture, Haglund deformity, syndrome and disease, and Kager triangle/fat pad.

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## General discussion and implications for daily practice

The possible problems surrounding eponymous terms are multiple and we tried to investigate most of them in this thesis. In a stepwise manner we will give an answer to the questions we posed in our introduction.

*1. Does the meaning of an eponymous term change over time?*
When eponymous terms are followed over time, the assumed meaning of these terms can change. There is a specific place for the discussion of hyphenated eponyms that comprise two or more different findings to start with. The Pellegrini-Stieda lesion is a good example of this. Pellegrini described the medial collateral ligament of the knee as origin of the eponymous lesion on the medial side of the knee, while Stieda described the medial head of the gastrocnemius muscle. Both descriptions are applicable to just one eponymous term, therefore this term is even more liable to variable interpretation or use over time.

In **Chapter 2** of this thesis we concluded that the assumed meaning of the eponymous term Pellegrini-Stieda differs over time. We do not know whether we can extrapolate this finding to all eponyms, but it is known from literature that the nature of eponymous terms changes.[1–4]

In the case of the Pellegrini-Stieda lesion (PS lesion), it became clear that the development of better radiological modalities gave rise to more explanations for the origin of this lesion. In the first decades after the original description of the PS lesion, most papers about this subject referred to the opinion of only one of both original authors (mostly Pellegrini). Most assumptions were made without presenting additional evidence found during surgery or otherwise. Later, when new cases were presented based on new information from surgery or additional imaging, the definition of the PS lesion came under debate again.[5,6]

These findings led to an increase of possible origins for an ossification on the medial side of the distal femur. Regardless of their cause, almost all of these ossifications are considered PS lesions today. Along these lines, we conducted a study to reproduce the findings from the original papers by Pellegrini and Stieda, as can be found in **Chapter 3**. Our aim was to explore the radiological overlap in lesions involving the medial collateral ligament (MCL) and the medial head of the gastrocnemius muscle (GM). We tried to reproduce the original images as presented by Pellegrini and Stieda. It should be concluded that it is plausible for the lesions involving either the MCL or the GM to have the same appearance on conventional X-rays.

In less than 100 years after the original publications appeared, other papers have shown that the origin of any PS lesion might be attributed to multiple structures.[5–7] The eponymous term is still used today, as is shown in **Chapters 2 and 6.** The question remains what definition of the PS lesion authors publishing on this topic should use.

Part of the question of whether the meaning of an eponymous term changes over time can be answered by our findings in **Chapter 7**. Here we found a wide variety of supposed meanings of eponymous terms. Since we only reviewed these eponyms over a period of one year, it is not possible to establish a changing pattern in the meaning of these terms. More research is needed in the future. More eponymous terms could be followed over time to establish whether there is a changing pattern to be identified. In recent literature it has been established that as time progresses after the original publication, more often it is not the original source (direct referencing) but a secondary source referring to the original source (indirect referencing) which gets referred to.[8]

The meaning of an eponymous term could thus easily change over time, especially if the original source is no longer being retrieved.

*2. Are eponymous terms used in daily practice?*
Eponymous terms are generally still part of our daily practice. Such terms are used both in the Netherlands and internationally. In the Netherlands we have established that eponymous terms are used quite commonly (**Chapter 6)**. In the group of 58 orthopedic surgeons that were surveyed, at least two knew all the 57 eponymous terms presented to them. There was a positive correlation between region of interest and amount of knowledge about eponymous terms associated with same region of interest for upper extremity injuries, trauma and general orthopedics. This might eventually lead to a shift in knowledge and use of eponymous terms along with the development of super-specialized orthopedic surgeons as compared to general orthopedic surgeons. In concordance with this development, peers with different regions of interest or specialization might be more liable to miscommunicate or misinterpret eponymous terms. As basic training in orthopedic surgery still has a general orientation, we feel that this development will not come very soon.

In **Chapter 8** we focused on this question for common practice on an international level. The results showed that 75% of the respondents to our survey used eponymous terms in their daily communication with colleagues. Eponymous terms were used in daily practice by 80% of European respondents and 63% of North American respondents. Since this group of respon-

dents varies in terms of geographical diversity, region of interest and age, it is probably fair to say that the results from our survey are a good representation of the general international orthopedic community. We can conclude that although voices against eponymous terms are often heard, they are not eradicated from our daily discussions and communications. In our opinion this stresses the need for good education about the meaning of eponymous terms. This can be done during orthopedic training or maybe even during basic medical training. We feel that the persistent presence of eponymous terms in our work enriches our profession. This way we are reminded of our medical history and our predecessors, which form the basis of our current medical knowledge.

*3. Are eponymous terms used correctly in the literature?*

Eponymous terms are used inconsequently and therefore sometimes incorrectly in the literature. This phenomenon could be partially ascribed to the transition of direct referencing to indirect referencing. Such a shift may lead to errors or changes of interpretation.[8]

In **Chapter 2** we reported that shortly after the original papers of Pellegrini and Stieda were published, these papers were referred to without adding new findings by the referring authors. In these papers most authors chose to use only one of the structures named by either Pellegrini or Stieda. The followers of Pellegrini kept to the MCL as proposed origin and the followers of Stieda kept to the GM. This in itself perpetuates an incomplete (or incorrect) use of an eponymous term. It took some time before new findings were brought forth as possible origin of the PS lesion, like the medial patellofemoral ligament or the adductor magnus.

In **Chapter 7** we established that in 66% of the papers the authors described the meaning they related to the eponymous term they studied. Only in 33% of the papers was the original description used and in 33% of the papers a divergent meaning was put forward. This in itself need not cause any misunderstanding, as long as the employed meaning of the eponymous term is clarified in the article, for instance in the Materials and Methods section. The danger lies in the 33% of articles that did not describe the meaning of the eponymous term they studied. This may lead to different interpretations by readers and could result in errors. It should be avoided at all times, as it underlies miscommunication and error.

*4. Are eponymous terms used correctly in daily practice?*

In daily practice eponymous terms are regularly used incorrectly. We established in **Chapter 6** that eponymous terms are frequently used in daily practice, but we did not focus on their meaning. Hence we performed an international survey on the reliability of eponymous terms,

and report the results in **Chapter 8**. The percentage of appropriate use ranged from 45% to 75% per eponymous term. In the group of respondents from North America the percentage of appropriate use was 50%, and 63% used eponymous terms in daily practice. In Europe only 43% of respondents used eponymous terms appropriately, despite their widespread use at 80%.

In **Chapter 5** the discussion about eponymous terms is approached from another perspective, for an analysis of the meaning of the Simmonds-Thompson test. In this test the problem is not understanding of how the test should be conducted – the challenge lies in how the result should be interpreted and noted. The use of this eponymous test provides a unique moment of misunderstanding. When the clinical finding for performing the Simmonds-Thompson test is negative (no plantar flexion on calf compression), the result of the test is called positive. However, it is easy to understand how an observer might label a negative result (no plantar flexion on calf compression) as a negative Simmonds-Thompson test.

**Chapters 9 to 15** give an overview, albeit not exhaustive, of the original meaning of eponymous terms. This way they can be compared with their contemporary use.

*5. Are eponymous terms reliable?*

Eponymous terms are found to be unreliable. This topic is mainly addressed in **Chapter 8**. To assess reliability we calculated the proportion of agreement on eponymous terms. We found that agreement on the meaning of eponymous terms was low (Kappa 0.11, proportion of agreement 0.68). There was not one single term on which all respondents fully agreed, be it the original one or a different one. There was also low agreement on the use of eponymous terms in daily practice.

Although eponymous terms are unreliable, the proportion of respondents that prefer using an eponymous term over a classification system or description was 75%. It is therefore important to teach residents and surgeons about the meaning of eponymous terms. When using an eponymous term in literature or another form of communication, it is mandatory to state the supposed meaning of the eponymous term in order to prevent any form of miscommunication. To make a contribution to the knowledge of eponymous terms, we present several terms and their original meaning in **Chapters 9 to 15**.

The implications for daily practice are in our opinion that eponymous terms should always be regarded with a healthy dose of distrust – not because of the eponymous term itself, but

because of its supposed meaning and whether it differs from what is actually communicated. Although eponymous terms are easy shorthand, we should not purchase convenience at the expense of accuracy.[9] This means that when someone is in doubt or opinions on the meaning of an eponymous term differ, one should give a description of the eponymous term being used.

The same could be applied to eponymous terms used in literature. When preparing a manuscript the author should state the meaning of an eponymous term in the Materials and Methods section. If the author fails to do so, the editor or reviewers should be keen about adding definitions of eponymous terms. In this way the manuscript can undergo a good review process. When the paper is later referred to in a systematic review, there can be no confusion on the subject discussed. This makes comparability easier and more accurate.

It is stated that eponymous terms themselves might stimulate good work and result in better health care.[10] If this is true, then it is encouraging what we found in **Chapter 4** (Kager) and **Chapter 10** (Essex-Lopresti). These chapters show us that you do not have to have published more than one article nor have to be old or have years of experience to become an eponym.

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## Implications for further research

Further research about the use of eponyms could focus on the absolute number of eponyms used in the literature. Is this number diminishing or does it remain stable over time? Are new eponymous terms being added to our medical nomenclature? In discussing these matters the use of eponymous terms could also be approached. It is of interest whether the accuracy of their use will improve or worsen over time.

Another area of research in medical eponymous terms is the shift of direct referencing to indirect referencing over time, and whether this results in an increase of inaccurate explanations of eponymous terms.

There is also a task to investigate the origin of eponymous terms and to add these findings to our teaching curriculum. In this way the original meanings will be known to everyone and we will be able to judge whether eponymous terms are used accurately or not.

Lastly the best method by which eponymous terms can be taught could be a subject of further research.

## Personal perspective

Although this thesis has mostly put forth a critical note on eponymous terms, my personal perspective is that eponymous terms should stay. The way they remind us of our history and act as colorful antagonists to descriptions and numbered classifications is refreshing and keeps us alert. We need to be aware of the possible flaws with eponymous terms, but in my opinion that does not justify discarding them. The work done by our predecessors is highly valuable and of influence to our current knowledge, and should be commemorated. Having knowledge of the background of the discoveries and reports that led to these predecessors becoming eponyms is part of keeping our medical practice human. Surgical practice is based on work done by people for people.

Matthijs Somford, January 2018

## Nederlandse samenvatting

Er zijn veel eponiemen die gebruikt worden in onze dagelijkse communicatie en de medische terminologie. Naar mate de tijd vordert zijn ze steeds moeilijker te herkennen omdat ze veelal zonder hoofdletter worden geschreven. Eponiemen vormen een makkelijke manier van communiceren, maar ze kunnen ook leiden tot misinterpretaties.[1,2] Er zijn twee groepen die direct tegenover elkaar staan in de discussie of eponiemen wel of niet gebruikt dienen te worden.[1–5] In dit proefschrift is de rationale voor deze discussie uiteengezet. We hebben gepoogd vast te stellen hoe eponiemen ontstaan en wat er gebeurt met hun interpretatie in de loop der tijd. Daarnaast hebben wij ook bekeken wat de huidige plaats van eponiemen is in de orthopedisch chirurgische praktijk.

**Hoofdstuk 1** geeft een algemene introductie op dit proefschrift en beschrijft de doelen en geeft een overzicht van de uitgevoerde studies.

*Deel I: Over het ontstaan van eponiemen*
In het eerste deel van dit proefschrift is onderzocht hoe eponiemen ontstaan, hoe er aan gerefereerd wordt en hoe een gekoppeld eponiem bestaande uit twee of meer namen kan leiden tot verwarring in de loop der tijd. Door de bibliografie en de herkomst van een eponiem te achterhalen wordt duidelijk hoe een eponiem ontstaat.

In **Hoofdstuk 2** hebben wij gekeken naar de origine van de Pellegrini-Stieda (PS) laesie en de veranderingen die dit eponiem over de tijd heeft doorgemaakt. In de originele publicaties wordt het mediaal collaterale ligament (MCL) van de knie (Pellegrini) als ook de mediale kop van de musculus gastrocnemius (GM) (Stieda) geduid als oorsprong van de benige schaduw aan de mediale zijde van de knie. Tegenwoordig wordt de origine van de PS laesie vaak alleen aan de MCL toegewezen.

Door alle artikelen (N=37) over de PS laesie van 1905 tot heden te analyseren kregen wij een overzicht van alle anatomische structuren die over de tijd zijn toegeschreven aan de PS laesie. Het MCL werd in de meeste artikelen genoemd als origine van de PS laesie (54%) en de GM werd slechts in 6% van de artikelen genoemd als oorzaak. Als de we artikelen excludeerden die niet gebaseerd waren op chirurgische of radiologische bevindingen, veranderden de inzichten over de origine van het eponiem. Op MRI werd het MCL slechts in 25% van de artikelen gezien als enige origine de PS laesie en de GM in 0%. Indien er een operatieve interventie werd uitgevoerd rapporteerde 57% van de artikelen het MCL als origine en 7% de GM. Overige

structuren die genoemd werden waren onder andere het mediale patellofemorale ligament (MPFL) en de adductor magnus. Mogelijk kan dit verklaard worden doordat ossificaties in het MCL klachten geven, wat een indicatie kan zijn voor chirurgische resectie.

In 2006 werd de adductor magnus pees aangewezen als mogelijk origine van de PS laesie op basis van MRI beelden. Recent is op basis van de bevindingen bij MRI het MPFL toegevoegd aan de lijst van mogelijke origines van PS laesies. In de studie van McArthur et al was de ossificatie in 26% van alle gevallen (N=27) gelokaliseerd in het MPFL.[6] In alle geraadpleegde literatuur werd er in 25% van de gevallen geen specifieke structuur gevonden als origine van de PS laesie.

In **Hoofdstuk 3** vervolgen wij ons onderzoek naar de PS laesie in een studie op kadaver knieën. Omdat de discussie of de PS laesie voortkomt uit het MCL of de GM nog steeds gaande is, zoals respectievelijk door Pellegrini en Stieda werd beschreven, hebben we in een radiologische studie de oorspronkelijke radiologische bevindingen uit de originele studies van 1905 en 1908 nagebootst. Ons doel was om vast te stellen of ossificaties in het MCL en de GM op conventionele röntgenbeelden met elkaar overeenkomen.

In 6 kadaver knieën werd zowel de MCL als de GM vrijgeprepareerd en vervolgens werd een van beide structuren geïnjecteerd met een radio-opaque contrastvloeistof en afgebeeld op een röntgenfoto. Deze opnamen werden vergeleken met de originele röntgenbeelden uit de publicaties van Pellegrini en Stieda. De röntgenbeelden werden met elkaar vergeleken door een onafhankelijke onderzoeker om te bepalen of hij een MCL laesie van een GM laesie kon onderscheiden op een normale röntgenfoto (AP). Hieruit bleek dat hij op basis van de röntgenbeelden niet kon vaststellen welke anatomische structuur gemarkeerd was. Nadat de afstand van het meest proximale gedeelte van de radio-opaque markering in het MCL of de GM naar het tibiaplateau was gemeten, werden de röntgenfoto's opnieuw vergeleken. Deze methode van meten werd gekozen omdat de origo van het MCL iets proximaler op het femurcondyl ligt bij een gestrekte knie in vergelijking met de insertie van de GM. Na het uitvoeren van de metingen werd in 2 van de 3 anatomische preparaten (66%) de markering op het röntgenbeeld correct geclassificeerd voor zowel het MCL als de GM.

Deze studie toont dat een conventioneel röntgenbeeld onbetrouwbaar is om een onderscheid te maken tussen een ossificatie in het MCL of de GM. Daardoor blijft het vooralsnog onbekend welke anatomische structuur ten grondslag ligt aan een PS laesie.

In **Hoofdstuk 4** gaan wij verder in op de herkomst van eponiemen. Hoe ontstaat een eponiem en hoe evolueert deze door de tijd? Daarvoor hebben we het eponiem Kager driehoek onderzocht. De Kager driehoek is een zone in de enkel die begrenst wordt door de Achillepees posterieur, calcaneus distaal en de flexor hallucis anterieur. Om een beter inzicht te krijgen in de herkomst van dit eponiem hebben wij onderzoek gedaan naar het leven en werk van Hans Alois Kager (1910-1941). Kager heeft in 1939 een artikel gepubliceerd over Achillespees rupturen waarin hij de zogenoemde Kager driehoek beschrijft, maar deze niet naar zichzelf vernoemt. Pas negentien jaar later vinden we de eerste referentie naar het eponiem Kager driehoek. De term wordt genoemd in een artikel van Arner in 1958.[7] In 1939, het jaar waarin Kager zijn artikel publiceerde, werkte hij in het Hohenlychen Sanatorium, welke een slechte reputatie zou krijgen tijdens het Nazi regime. Waarschijnlijk heeft hij nooit meegewerkt aan, noch is hij getuige geweest van de misdaden tegen de mensheid die hier hebben plaatsgevonden aangezien hij in dienst van het Duitse leger (Wehrmacht) ging en stierf aan het front in 1941. Tot slot laat ons onderzoek zien dat een enkele publicatie er toe kan leiden dat naam van de auteur een eponiem wordt.

*Deel II: De (mogelijke) ondergang van eponiemen*

In het tweede deel van dit proefschrift verleggen wij onze focus naar het hedendaagse gebruik van eponiemen. Verschillende aspecten werden geanalyseerd. Onder andere dat verwarring kan ontstaan als de betekenis van een eponiem niet goed gedefinieerd is. Dit is minder vaak het geval bij beschrijvende termen omdat de naam dan de inhoud dekt. Ook hebben we het huidige gebruik van eponiemen zowel op nationaal als internationaal niveau bestudeerd. Daarnaast evalueerden we de betrouwbaarheid van het gebruik van eponiemen en of onze vakgenoten er voor kozen om met name eponiemen te gebruiken in plaats van classificaties of beschrijvende termen. Het doel hiervan is om een beeld te krijgen of het verstandig is om eponiemen juist wel of niet te gebruiken in de hedendaagse medische communicatie.

Door de Simmonds-Thompson test te analyseren, bediscussiëren we in **Hoofdstuk 5** het belang van het begrijpen en interpreteren van de resultaten van een klinische test die niet beschrijvend (bv de naam van de test is de uit te voeren actie zoals bij voorste schuiflade) maar een eponiem is. Er zal verwarring ontstaan als er verschillende opvattingen zijn tussen professionals over de betekenis van een ‘positieve’ test. Over het algemeen kan het resultaat van een klinische test positief of negatief genoemd worden, afhankelijk van de verwachte uitkomst. De Simmonds-Thompson test is een diagnosticum voor een Achillespees ruptuur en niet een test die aangeeft of de pees nog heel is. Dit betekent het dat het afwezig zijn van plantair flexie van de voet bij compressie van de kuit geïnterpreteerd zou moeten worden als

een positief test resultaat. Ons artikel geeft helderheid over de mogelijke miscommunicatie die kan ontstaan bij de interpretatie van een klinische test die aangeduid wordt als een eponiem. Wees daarom alert dat niet-beschrijvende testen juist worden uitgevoerd en geïnterpreteerd. Biografisch is het opvallend dat beide mannen niet erg van hun voornaam hielden (Franklin en Theodore) en hun bijnaam prefereerden (Sam en Tommy).

**Hoofdstuk 6** beschrijven wij de resultaten van een Nederlandse enquête onder orthopedisch chirurgen over het gebruik van en de kennis over eponiemen in de hedendaagse praktijk. We hebben gekeken naar de verschillen in kennis over en gebruik van de eponiemen en dit vergeleken met het interessegebied en het aantal jaren ervaring van de orthopedisch chirurgen. In totaal werden 58 van de 67 enquêtes volledig ingevuld en geretourneerd. Er was geen significant verschil in het gebruik van en de kennis over eponiemen als we orthopedisch chirurgen met meer en minder ervaringsjaren met elkaar vergeleken. Orthopedisch chirurgen die “algemene orthopedie”, “trauma” en/of “bovenste extremiteit” als aandachtsgebied aangaven kenden significant meer eponiemen uit dat aandachtsgebied dan orthopedisch chirurgen die andere aandachtsgebieden kozen (“kinderorthopedie’, “wervelkolom”, “onderste extremiteit”, “sport”). Het lijkt dat super-specialisatie, meer dan hedendaagse training of afgenomen interesse in het gebruik van eponiemen in het algemeen, mogelijk bijdraagt aan een verandering in het gebruik van eponiemen in de dagelijkse praktijk.

Voor **Hoofdstuk 7** voerden we een systematische literatuurstudie uit om vast te stellen of er consensus is over de betekenis van eponiemen en of de gebruikte betekenis overeenkomt met de oorspronkelijke omschrijving van het eponiem. Aanvankelijk werden er 12 bekende eponiemen in schouder- en elleboogchirurgie geselecteerd. Deze eponiemen kwamen alleen in aanmerking voor verdere analyse als ze bij een literatuur search in tenminste 10 artikelen genoemd werden. Dit resulteerde uiteindelijk in 6 eponiemen die meer dan 10 artikelen opleverden bij de zoekresultaten en deze werden vervolgens verder geanalyseerd. We analyseerden 96 artikelen waarbij 27 (28%) een betekenis aan het eponiem gaven die afweek van de originele omschrijving van het eponiem. In 32 (33%) artikelen werd geen definitie gegeven van het gebruikte eponiem. Slechts in 37 (39%) artikelen gebruikte men een omschrijving die overeenkwam met de originele beschrijving. Bristow-Latarjet scoorde het laagste met 0% overeenkomst met de originele beschrijving. Dat betekent dat alle artikelen over Bristow-Latarjet een afwijkende of niet gedefinieerde betekenis hadden. Essex-Lopresti scoorde het hoogst waarbij 82% van de artikelen een overeenkomstige beschrijving hanteerden in vergelijking met het originele artikel. We concluderen dat eponiemen inadequaat en inconsistent gebruikt worden in de literatuur, wat kan leiden tot misinterpretatie van onderzoeksresultaten en miscommunicatie.

Om de betrouwbaarheid van het gebruik van eponiemen te evalueren voerden we een internationale enquête uit, waarvan de resultaten worden beschreven in **Hoofdstuk 8**. Door middel van een online enquête werden 224 orthopedisch chirurgen benaderd met een vragenlijst, die was opgesplitst in twee delen. Eerst werden er 10 vragen gesteld over de originele betekenis bij een eponiem, waarbij de originele betekenis geplaatst was tussen licht afwijkende beschrijvingen. De overeenkomst van elk eponiem met de originele betekenis (genoemd: juist gebruik) werd berekend met 95% betrouwbaarheidsinterval. We bepaalden de betrouwbaarheid van het gebruik van de eponiemen met behulp van Kappa statistiek en 'proportion of agreement'. Het percentage van juist gebruik was gemiddeld 45% (spreiding van 27% voor Barton fractuur tot 75% voor morbus Sever), waarbij de eponiemen vaker onjuist werden gebruikt onder Europese orthopedisch chirurgen. De betrouwbaarheid van het gebruik van eponiemen was laag (Kappa 0,11, proportie van overeenkomst 0,68).

Het tweede gedeelte van de enquête werd uitgevoerd om te achterhalen hoe orthopedisch chirurgen 10 aandoeningen en structuren aan hun vakgenoten zouden omschrijven. De antwoord opties bestonden uit eponiemen, beschrijvende termen en classificaties. Eponiemen werden over het algemeen vaker gekozen dan anatomische beschrijvingen of classificaties. Over het algemeen bestond 74,7% van de antwoorden uit een eponiem. Het gebruik van eponiemen in de dagelijkse praktijk was significant lager onder orthopedisch chirurgen die praktiseerden in de Noord Amerika (63%) in vergelijking met hun collega's uit Europa en Zuid Amerika (80%: $p<0,001$).

We concluderen dat eponiemen een inaccurate en onbetrouwbare methode van communicatie zijn, maar dat orthopedisch chirurgen er toch voor kiezen om ze te blijven gebruiken. Het is goed mogelijk dat iedere orthopedisch chirurg ervan overtuigd is de juiste betekenis van een eponiem te kennen. Deze studie zou het gebruik van eponiemen kunnen veranderen. Enerzijds door iedereen er zeker van te laten zijn dat hij de betekenis kent (bijvoorbeeld middels scholing) anderzijds door eponiemen minder te gebruiken in onze dagelijkse praktijk.

*Deel III: Voor het geval eponiemen blijven bestaan*

Aangezien we hebben vastgesteld dat eponiemen vaak worden gebruikt maar dat hun gebruik gepaard gaat met misinterpretaties, is het belangrijk om de oorspronkelijke betekenis van de eponiemen te kennen. Daarom wordt in dit derde deel van dit proefschrift, een groot aantal eponiemen, die regelmatig worden gebruikt binnen de orthopedische chirurgie, verhelderd. Voor elk eponiem zochten we de originele publicatie waarop deze eponiemen zijn gebaseerd en presenteren we hiervan onze bevindingen. De beschrijvingen van de eponiemen

worden aangevuld met een korte biografie van de naamgever. Daarnaast hebben wij ook de hedendaagse klinische relevantie van deze eponiemen uiteengezet. Dit laatste deel van het proefschrift is geordend op anatomische oriëntatie van craniaal naar caudaal. Alle artikelen over de verschillende eponiemen hebben een beschrijvend karakter en daarom bevatten ze geen algemene conclusie behoudens de algemene beschouwing op de zaken die gepaard gaan met eponiemen, al dan niet toegespitst op de beschreven eponiemen, zoals eerder in dit proefschrift beschreven.

In **Hoofdstuk 9** gaan wij in op een aantal eponiemen die geassocieerd worden met anterieure schouder instabiliteit: de Perthes laesie, Bankart laesie en herstel, Hill-Sachs laesie, Bristow-Latarjet procedure en Eden-Hybbinette procedure.

**Hoofdstuk 10** beschrijven wij een serie eponiemen die gerelateerd zijn aan letsel van de elleboogregio. We bespreken de Holstein-Lewis fractuur, Essex-Lopresti letsel, Volkmann contractuur, Kocher incisie, Monteggia fractuur-dislocatie, Galeazzi fractuur-dislocatie en de Kaplan benadering.

**Hoofdstuk 11** behandelt een reeks eponiemen die samenhangen met bekkenletsel. Eponiemen die worden besproken zijn de Duverney fractuur, Malgaigne fractuur, Judet-Letournel classificatie, Kocher-Langebeck benadering en Stoppa benadering.

Benaderingen van de heup zijn het onderwerp van **Hoofdstuk 12**. Hier bediscussiëren we de Smit-Petersen, Watson-Jones, Charnley, Southern of Moore en Ludloff benaderingen.

Het knie gewricht staat centraal in **Hoofdstuk 13**. Eponiemen die besproken worden zijn het tuberkel van Gerdy, Pellegrini-Stieda laesie, Segond fractuur, Hoffa fractuur en Hoffa vetlichaam.

In **Hoofdstuk 14** bespreken we fracturen in de enkel regio. Eponiemen die worden besproken zijn de Pott fractuur, Dupuytren fractuur, Volkmann driehoek, Bosworth fractuur, Maisonneuve fractuur, Le Fort-Wagstaffe fractuur, Tillaux-Chaput fractuur, Lauge-Hansen classificatie en Danis-Weber classificatie.

De posterieure zijde van de enkel, ook bekend als Kager driehoek, wordt besproken in **Hoofdstuk 15**. Eponiemen die in dit hoofdstuk naar voren komen zijn de Achillespees, morbus Albert, Rouvière en Canelo Lazaro ligament, morbus Sever, Stieda proces, Shepherd fractuur, Haglund exostose, syndroom en morbus Haglund en de Kager driehoek/vetlichaam.

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**Persoonlijk perspectief**

Alhoewel dit proefschrift met name een kritische noot heeft geplaatst bij het gebruik van eponiemen, is het mijn persoonlijke mening dat eponiemen behouden moeten blijven. De wijze waarop ze ons herinneren aan onze voorgangers en zoals ze kleurrijke antagonisten zijn van beschrijvingen en genummerde classificaties is verfrissend en houdt ons alert. We moeten voor de mogelijke beperkingen van de eponiemen waken, maar naar mijn mening rechtvaardigt dat niet het afschaffen ervan. Het werk wat door onze voorgangers is verricht, is zeer waardevol. Het is van blijvende invloed op onze huidige kennis en verdient daarom een blijvende herinnering. Het hebben van kennis over de historische achtergrond van deze ontdekkingen en publicaties die ertoe hebben geleid dat namen van onze voorgangers werden verbonden aan deze eponiemen, is onderdeel van het menselijk houden van onze medische praktijk. Ons chirurgisch vak is gebaseerd op werk door mensen voor mensen.

Matthijs Somford, januari 2018

# APPENDIX

**List of co-authors and affiliations**

**List of eponyms discussed**

**About the cover**

**Publications outside this thesis and presentations**

**Courses/trainings and congresses**

**Dankwoord**

**Curriculum Vitae**

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## LIST OF EPONYMS DISCUSSED

## ABOUT THE COVER

You should never judge a book by its cover, but it is worth the time to look at the cover of this thesis for a little more detail. The design is meant to give the feeling that this thesis is a book from earlier days. This is a direct link to the content, where a part of the history of orthopaedic surgery is discussed. The inspiration for using this type of design came from books that were used to obtain the key publications of for instance Kocher and Watson-Jones.

Specific details are the small silhouettes put in the design. The word silhouette is, probably not surprisingly, an eponymous term. It is named after Étienne de Silhouette (July 5, 1709 – January 20, 1767). This was a French politician and financial controller-general under king Louis XV. He was known for his penny-pinching. In those days the cut-out art that came to bear his name was the cheapest form of portraying. Therefore people made the connection between his harsh financial decisions and this art form. Since part of the aim of this thesis is to give the eponyms their face back by linking their biographies to the eponymous terms, silhouettes are fitting in this context.

# PUBLICATIONS OUTSIDE THIS THESIS AND PRESENTATIONS

## Publications

*Reviews*

EL Zwerus, **MP Somford**, F Maissan, J Heisen, D Eygendaal, MPJ van den Bekerom. Physical examination of the elbow, what is the evidence? A systematic literature review. Br J Sports Med. 2017 Mar 1. [Epub ahead of print]

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MPJ van den Bekerom**,** PC Geervliet**, MP Somford,** MPJ van den Borne**,** R Boer**.** Total shoulder arthroplasty versus hemiarthroplasty for glenohumeral arthritis: A systematic review of the literature at long-term follow-up; International Journal of Shoulder Surgery;2013 7(3)110-5

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AWM Stolwijk, A van Wensen, MAA van Hooft, JM Franken, **MP Somford**, L van der Laan, DI Vos; Een vorstperiode van drie weken: analyse van gevolgen voor een perifeer ziekenhuis en bruikbaarheid van triagesysteem; Nederlands Tijdschrift voor Traumatologie. 2010 jun(3):66-73

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JJON van den Bosch, TWGM Meys, BLEF ten Have, **MP Somford**. Spontaneous quadratus femoris tear – a case and review of current literature. NTvO. 2017;24(2):53-7

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*Book discussions*

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**MP Somford**, P Kloen. Boekbespreking; Nederlands Tijdschrift voor Traumatologie. 2010; 18(3):89

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In: Displasia de cadera del adulto. 2011; pag 199-206

**MP Somford**, P Kloen; Nonunion of unicondylar distal femoral fracture (Hoffa nonunion); 671-5
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P Kloen, **MP Somford**, RK Marti; Nonunion of the tibial shaft – introduction; 741-53
In: R.K Marti, P Kloen; AO Trauma, concepts and cases in nonunion treatment, AO publishing

**MP Somford**, P Kloen; Tibial shaft nonunion after plate osteosynthesis treated with reamed intramedullary nailing; 823-6
In: R.K Marti, P Kloen; AO Trauma, concepts and cases in nonunion treatment, AO publishing

**MP Somford**, P Kloen; Distal tibia nonunion treated with reamed intramedullary nailing; 859-65 In: RK Marti, P Kloen; AO Trauma, concepts and cases in nonunion treatment, AO publishing

*Presentations*

**MP Somford,** D Hoornenborg, JI Wiegerinck, SBT Bolder, BW Schreurs; Eponyms in orthopaedic surgery, approaches to the hip. Combined meeting BHS/SIDA 2015, Milaan

**MP Somford**, D Hoornenborg, JI Wiegerinck; Eponyms in orthopaedic surgery, approaches to the hip. EHS 2014, Stockholm

**MP Somford** vs B van Wageningen; Collumfractuur bij een 71 jarige: Totale heup prothese vs. kophalsprothese. Battle op de Traumadagen 2012

**MP Somford**, MFAM Sturm, JPAM Vroemen. Isolated scaphoid dislocation with axial dissociation in the presence of a carpal anomaly; 19th hand and upper limb symposium, 2011, Genval/Brussel

D Haverkamp, **MP Somford (spreker)**, MN Klinkenbijl, GHR Albers, H van der Vis. BMI en totale heup prothese; NOV najaarsvergadering 2010.

**MP Somford**, MFAM Sturm, JPAM Vroemen; Wat is er aan de hand?; Assistentensymposium NVT, 2009, Soestduinen

**MP Somford**; Zak maar lekker door; SORG 2007 Sittard

*Posters*

**MP Somford**, MPJ van den Bekerom, P Kloen; Operatieve behandeling van femurschacht pseudarthrosen, een systematische beoordeling van de literatuur; Traumadagen 2011

**MP Somford**, SBT Bolder, JWM Gardenier, TJJH Slooff, BW Schreurs; Favorable Long-term results of acetabular reconstruction with bone impaction grafting in dysplastic hips; EFORT 2007, EHS 2008

## COURSES/TRAININGS AND CONGRESSES

2017
- Studiereis DOSSS, dr M. Lugovskoi, Tallinn; ‘Ganz osteotomy’
- Arthroscopy and arthroplasty, knie (organisatie/faculty)

2016
- Arthroscopy and arthroplasty, knie (organisatie/faculty)
- ATLS provider (instructeur)
- Dissectie cursus UMC Groningen (instructeur onderdeel enkel)
- Studiereis DOSSS, Prof. M.A. Catagni, Lecco; ‘Taylor spatial frame’
- NVA masterclass

2015
- Cursus knieprothesiologie AMC (faculty)
- Arthroscopy and arthroplasty, knie
- ATLS provider (instructeur)
- Amsterdam Foot and Ankle Course (faculty)

2014
- Kniecursus: complex primary to revision, Arezzo
- Studiereis DOSSS, Prof. J. Bartoniček, Praag; ‘Bosworth hip shelf arthroplasty’
- Generic Instructor Course ALSG Nederland
- ATLS provider
- Amsterdam Foot and Ankle Course (faculty)

2013
- OTC III, more than basic fracture care
- Fixateur Externe voor Tropenarts, Joost Horbach cursus

2012
- Cementeringscursus, Malmö, Zweden

2011
- AO Advanced cursus
- Basiscursus voetchirurgie, hallux valgus
- Basis cursus stralingsbescherming, deskundigheid 4A/M
- Oxford instructional course
- Scopiecursus 3 NVA
- Heupcursus

2010
- Dissectiecursus bewegingsapparaat
- Pathologische Fracturen

2009 - Signalering, interventie en preventie kindermishandeling
- OTC II basiscursus

2008 - FCCS, basiskennis en vaardigheden Intensive Care
- AO fractuurbehandeling en weke-delen benadering
- Traumaregistratie: Letselcodering

2007 - ATLS provider, Chicago, U.S.A.

2006 - ACLS provider, Willemstad, Curaçao

**Congresses**

2017 - NVA jaarcongres
- Combined meeting DHS/BHS

2016 - NOV jaarcongres

2015 - Combined meeting British Hip Society/ Società Italiana dell'Anca, Milaan
- NOV najaarsvergadering
- NVA jaarcongres
- Paterswolde congres
- NOV voorjaarsvergadering

2014 - EHS, Stockholm
- NOV jaarcongres
- NVA jaarcongres

2013 - Traumadagen 2013
- NOV najaarsvergadering
- International sports medicine and knee arthroplasty meeting
- Instructional course – knee resident course
- Damage control resuscitation symposium
- NVOT lustrum congres
- NOV voorjaarsvergadering

- NOV jaarcongres

2012
- Traumadagen 2012
- NOV jaarcongres
- NOV voorjaarsvergadering

2011
- Traumadagen 2011
- NOV voorjaarsvergadering
- NOV jaarcongres

2010
- Traumadagen 2010
- Kniesymposium, early arthritis
- NOV najaarsvergadering
- NOV jaarcongres

2009
- Traumadagen 2009
- Assistentensymposium NVvT
- NOV jaarcongres

2008
- Traumadagen 2008
- NOV jaarcongres

2006
- Cementing University (Contemporary Cementing Techniques in Cemented implants)

## Dankwoord

Een proefschrift komt nooit tot stand door het werk van slechts 1 persoon. In mijn geval ben ik me daar op een bijzondere manier van bewust, omdat ik zonder de inzet en toewijding van vele personen, variërend van Homerus die schreef over Achilles tot Hans Kager die zijn artikel schreef waardoor zijn naam bleef bestaan, geen motivatie had gehad om het voorliggende werk te schrijven. Zonder de geschiedenis was deze promotie er nooit gekomen. Daarnaast hebben mij in het heden vele mensen geholpen en bijgestaan op allerlei fronten, daarvan hier een overzicht en ik hoop dat ik zo volledig mogelijk ben.

Mijn promotor, **prof. dr. D. Eygendaal**. Lieve Denise, toen we elkaar voor het eerst troffen, jij als opleider en ik als AIOS, was me meteen duidelijk dat je interesse voor je assistenten verder ging dan alleen ons werk in de kliniek. Het duurde niet lang of we hadden het over wat mijn plan was en of ik nou niet eens wat met 'de verhaaltjes' moest doen die ik schreef. Dit nam ik ter harte maar andere ontwikkelingen, ook wetenschappelijk, hadden nog de overhand. Het onderwerp keerde wel weer terug toen ik als chef de clinique je weer trof, nu als directe collega. Door je geloof in mij en mijn ambities en je steun moest het er van komen dat je promotor bent van mij en dit boek met verhaaltjes. Je bent een voorbeeld voor mij. Je reacties zijn snel en compleet, dat maakt werken met jou ontzettend fijn. Ik ben blij dat ondanks dat jij de voor- en ik de achterpoot behandel, we elkaar regelmatig blijven treffen door A&A, AMC of wellicht een nieuw project.

Promotor **prof. dr. C.N. van Dijk**. Beste Niek, waar je eerst mijn opleider was ben je nu ook mijn promotor. Het is fijn om ook op deze wijze Amsterdam toch steeds weer terug te laten keren in mijn leven. Daarnaast is het ook leuk dat toch wel tegen mijn verwachting in door de opgedane kennis en ervaring op voet/enkel gebied tijdens mijn opleiding dit nu is verworden tot mijn aandachtsgebied.

Co-promotor en mede-historofiel **dr. F.F.A IJpma**. Beste Frank, wat ben ik blij dat jij je proefschrift al af had, anders was de kans dat ik je had gevonden om me bij te staan bij mijn promotie bijzonder klein geweest. Ik ben onder de indruk van je enthousiasme en de toewijding waarmee je met mij de originele stukken uitpluist. Je interesse voor de tijd dat geneeskunde nog in de kinderschoenen stond sluit naadloos aan op mijn bezigheden. Door samen te werken met jou kreeg ik niet meer werk vóór mijn promotie maar wel voor daarna. Ik kijk er naar uit het volgende onderzoek met je op te pakken en bier drinkend plannen te maken.

Leden van de manuscriptcommissie, **prof. dr. T.M. van Gulik**, **prof. dr. R.H.G.G. van Hee**, **prof. dr. R.J. Oostra, dr. M.U. Schafroth, prof. dr. I.B. Schipper** en **dr. R.G. Zuurmond**. Dank jullie wel voor het beoordelen van het manuscript en de goedkeuring. Ik kijk uit naar de oppositie!

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**Drs. D. Meijer.** Beste Diederik, naast auteur van en prachtig stuk over Pellegrini-Stieda, ben je met name een enorme hulp geweest bij de lancering van de internationale survey. Rond en zelfs tijdens Kerst kon ik je bellen om de boel helemaal lopend te hebben op het juiste moment. Op een cruciaal moment voor mij was je zelfs tijdens het kerstdiner beschikbaar om de zaken op orde te krijgen wat geresulteerd heeft in een voor mij zeer belangrijke publicatie voor dit proefschrift.

**Drs. B.J.W. Thomassen**. Lieve Bregje, dat jij niet in mijn lijst van mede-auteurs van dit proefschrift staat is eigenlijk onterecht. Jij stond aan de start van mijn wetenschappelijke aspiraties maar je hebt met name ervoor gezorgd dat ik er mee ben doorgegaan. Je inzet en bereidheid om me steeds weer te helpen als ik vond dat ik genadeloos vast zat heeft er voor gezorgd dat ik nooit de motivatie verloor. Waar het eerder het plan was om op bisfosfonaten te promoveren waar je wezenlijk aan hebt bijgedragen, is het anders gelopen en mist daarom je naam bij de artikelen, maar in dit dankwoord hoort hij zeker!

Mijn vaste co-auteur **dr. J.I. Wiegerinck**. Beste JJ, co-auteur van het eerste uur. Je nimmer aflatende enthousiasme voor mijn stukken en met name de drang om tijdens onze zeer memorabele wetenschappelijke excursies op locatie elke hint tot op de bodem uit te zoeken zijn onderdelen van de bijdrage die onontbeerlijk is geweest voor dit proefschrift. Dus: drei Männer in der Staube mit hunger! Er schijnt een museum van Latarjet zijn vader te zijn in Lyon, wie boekt het hotel?

Paranimfen, **drs D. Hoornenborg** en **drs. (nog steeds) M.P.J. van den Bekerom.** Daniël, het dreigde eerst allemaal over de ‘bisfosfanaten’ te gaan, maar gelukkig is het terug gekomen bij eponiemen. Sinds ik binnenkwam op de vieze kamer op G7 in het AMC was het duidelijk dat

we collegiale vrienden zouden worden. Dat we wetenschappelijk ook samen zouden werken was voor jou toen nog niet te bedenken maar het heeft mooie trips en artikelen opgeleverd. We zoeken elkaar steeds weer op en als het niet lukt om af te spreken in Nederland gaan we gewoon samen op congres. Paranymph betekent 'naast (para) de bruid (nymphe)', dat is je eerder ook goed afgegaan als mijn ceremoniemeester. Ik voorzie dus geen problemen. Je vriendschap is me zeer waardevol.
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**Stafleden van de vakgroep orthopedie Amphia Breda**. Vooropleiding, AIOS en chef, steeds weer met evenveel plezier. Ik denk vaak terug aan de fijne tijd bij jullie en de manier waarop jullie een ontspannen sfeer hebben terwijl er orthopedie op een hoog ambitieus niveau wordt bedreven. De eponymen van de heup benadering hebben hun oorsprong hier.

**Stafleden van de vakgroep orthopedie MST Enschede**. Een goede tijd met voor mij een fantastische kennismaking met een level I trauma centrum en de bijbehorende reuring (heerlijk). Hier ontstond een manuscript over Müller-Weiss, dat heeft het jammer genoeg niet tot dit proefschrift gehaald.

**Stafleden van de vakgroep orthopedie Martini Groningen**. De plek waar ik voor het eerst mijn patiënten voor hun jaarcontrole zelf kon zien omdat ik lang genoeg in dienst was. Ik ben dankbaar voor de mogelijkheid die jullie me gaven om na een waardevol fellowship langer te blijven als chef de clinique. Hier zag het stuk over de knie eponiemen het daglicht.

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Dan mijn eigen kleine mini: **Evie**. Zonder dat je het wist was jouw komst niet een rem op mijn proefschrift maar juist het vuur dat ik nodig had. Samen met mama zat ik de eerste weken na je geboorte jou te bewonderen en terwijl je bij ons lag te slapen werden de gesprekken over promoveren steeds intenser en nam het definitieve vormen aan. De eerste opzet voor dit boekje is geschreven tussen twee van jouw voedingen door. De computer is voor jou met name een zilveren ding dat je niet aan mag raken, maar nu is er een boek. En als je ergens dol op bent is het bladeren in een boek. Speciaal voor jou met plaatjes. Je bent een enorm sterke observator en niets ontgaat je blik. Je bent verlegen maar als je banden met mensen aangaat zijn ze sterk. Je bent leergierig en slim. Je kan acteren als de beste met prachtige volle tranen en een sterke imitatie van Sara met haar speelgoed in haar nestje. Ik ben benieuwd naar hoe je later gaat worden.

En mijn kleinste mini: **Sara.** Ik ben blij met je komst en geniet van elk moment. Je lach is innemend en heerlijk en je lacht gelukkig ongelooflijk vaak. Het is heerlijk om met jou op de arm de laatste letters van dit proefschrift te schrijven. Ik hoop dat je zo vrolijk en vriendelijk blijft en als ik zie hoe intens geïnteresseerd je naar Evie kijkt zie ik een duo vol kattenkwaad in de dop.

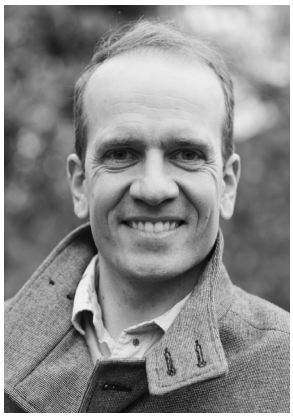
Mijn liefde: **Rebecca**. Liefste Becks, iedereen dankt in het proefschrift zijn partner; voor de ruimte die gegeven is, de verloren avonden en wat al niet meer. Dat valt bij ons eigenlijk wel mee. Ik wil je juist bedanken voor je bijdrage: aan de illustraties bij de artikelen, de databases netjes maken, de mede-auteurschappen en, alsof dit allemaal niet genoeg was, het mede-ontwerpen van dit boek. Het is met recht een werk van ons. Mijn naam staat op de kaft, maar jouw hand is overal te ontdekken. Meer nog wil ik je bedanken om wie je bent en wie je bent voor mij. Ik bewonder je kracht en doorzettingsvermogen. Deze zijn sterker dan ik ooit heb gekend. Ik heb grote bewondering en respect voor hoe secuur je grote en belangrijke keuzes afweegt en neemt. Jouw creativiteit is eindeloos en dat levert fantastische resultaten op. Je gedachten zijn scherp en je tong nog scherper. Je houdt me alert en maakt me preciezer. Je bent alles wat ik me kan wensen: een fantastische moeder, een heerlijke vrouw en boven alles ben je mijn allerbeste vriend! Er is niemand zoals jij bent voor mij.

# succes

succes mag je vieren
ook al is het maar klein
het is zo belangrijk
om gelukkig te zijn
met wat je gaat doen
of al hebt gedaan
je mag best heel even
stil blijven staan
bij iets wat nog komt
of al lang is geweest
er is altijd een reden
voor het vieren van feest.

r.o.

**Curriculum Vitae**



Matthijs Paul Somford was born in Nijmegen on the 22nd of February, 1979. He spent a happy childhood with his two brothers in Herveld-Zuid before attending the Stedelijk Gymnasium Nijmegen, where he received his diploma in 1998.

After studying medicine in Maastricht and enjoying all aspects of student life with a special fondness of mountainbiking in the hills surrounding this beautiful city, it was time to start his working days. After a short period as civilian doctor in military service at Valkenburg airbase, he switched the changing seasons for a single season, being the yearlong Caribbean summer on Curaçao. As a resident orthopedic surgery he got familiar with this profession and especially the care for orthopedic trauma patients was a great part of his work. Here the decision to aim for specialization in orthopedic surgery was made. A residency at the Maasland hospital (dr. A.D. Verburg) in Sittard was a good preparation for starting his specialization and gave a kickstart to his scientific career.

From 2007 until 2013 he was trained to become an orthopedic surgeon. His general surgery training was completed at the Amphia hospital (dr. J.H. Wijsman). For his orthopedic specialization he attended the AMC (prof. dr C.N. van Dijk), Tergooi hospitals (dr. G.H.R. Albers), Slotervaart hospital (prof. dr. R.G. Pöll) and the Amphia hospital (prof. dr. D. Eygendaal).

Then the odyssey started. While looking for the perfect place to land, he worked as chef de clinique in the Amphia hospital and the Medisch Spectrum Twente. This was followed by a fellowship knee surgery in the Martini hospital with a subsequent position as chef de clinique at the same hospital. Next and finally he worked as chef de clinique at the Rijnstate hospital where since august 2017 he is an attending orthopedic surgeon of the general and orthopedic surgery department with a special interest in hip surgery and foot and ankle surgery.

Matthijs is very happily married to Rebecca Nieuwe Weme and has two beautiful daughters, Evie and Sara. They live in Arnhem.